RAILROAD GAZETTE

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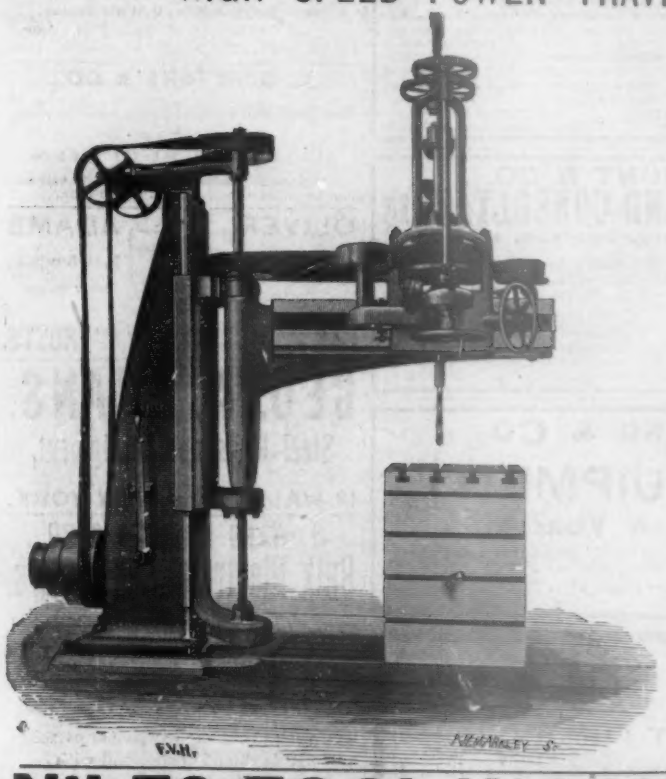

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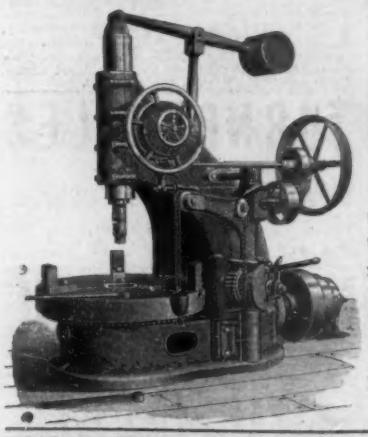

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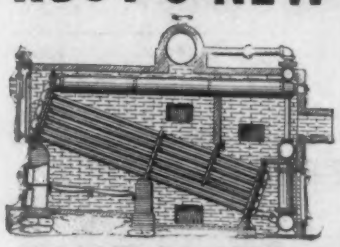

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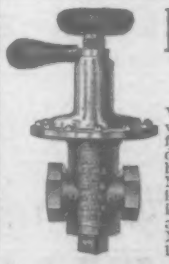

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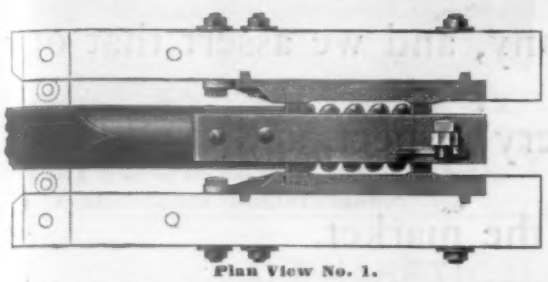
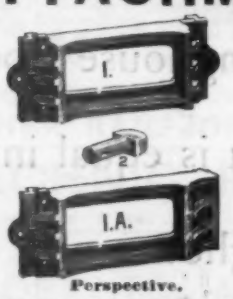
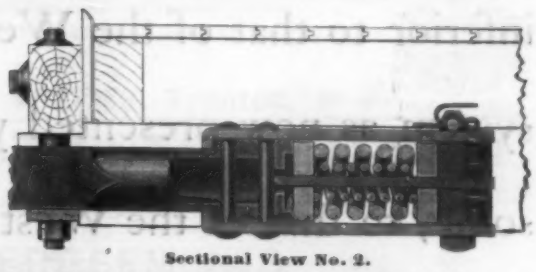


Plan View No. 1.



Perspective.



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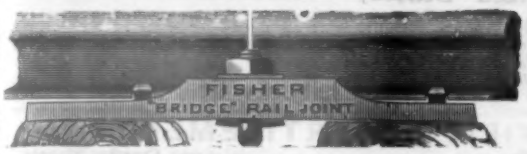

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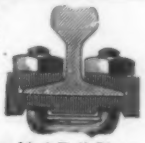

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ALPHABETICAL INDEX TO ADVERTISEMENTS.

[Classified Index on the next page.]

Abendroth & Root Mfg. Co. 2
Acme Machy. Co. 6
Adams, Oliver 1
Adams & Westlake Co. 9
Ajax Metal Co. 35
Akron Tool Co. 11
Allen Paper Car Wheel Co. 35
Allentown Rolling Mills 1
Allison Mfg. Co. 36
American Car Door Co. 23
Amer. Cont. Drawbar Co. 5
American Fluoride Co. 6
Amer. Steel Scraper Co. 16
American Steel Wheel Co. 1
American Washer & Mfg. Co. 34
Anderson & Barr 39
Appleton, Thomas 15
Ashcroft Mfg. Co. 9
Ashton Valve Co. 1
Austin, F. C., Mfg. Co. 15
Auto-Interch. Car Coup. Co. 29
Baker, Wm. C. 9
Baldwin Loco. W'ks. 37
Baltimore Car Wheel Co. 32
B. & O. R. R. 15
Barkly & House 11
Barnes, D. L. 12
Barnum & Richardson Mfg. Co. 34
Bement, Mills & Co. 8
Berlin Iron Bridge Co. 43
Berry & Orton Co. 9
Bethlehem Iron Co. 1
Billings & Spencer Co. 7
Blackmer & Post Pipe Co. 1
Bliss, E. W., Co. 9
Bloomsburg Car Co. 36
Bogue & Mills Mfg. Co. 9
Boston Bridge Works 39
Boston & Albany R. R. 35
Bowler & Co. 9
Boyden Brake Co. 14
Boyer Ry. Speed Recorder 16
Bradley, Osgood & Son 9
Bridgeport Mach. Tool Works 42
Brightly, C. H. 13
Brill, J. G. & Co. 36
Brooks Loco. W'ks 37
Brown Bros. & Co. 1
Brown Hoist. & Conv. Machine Co 16
Brown & Sharpe Mfg. Co. 22
Buckeye Auto. Car Coup. Co. 31
Bucyrus Steam Shovel & Dredge Co. 17
Buda Foundry & Mfg. Co. 33
Buffalo Seal & Press Co. 18
Burkhardt's, Geo. J. Sons 11
Bush Cattle Guard Co 11
Butler Drawbar Attach. Co. 14
Cabell, L. Breckinridge 13
Cambria Iron Co. 18
Canda Mfg. Co. 36
Canning, R. & Co. 1
Canton Steel Roofing Co. 40
Car Ventilator Co. 34
Carlin's Sons, Thos 13
Cayuta Wheel & F'dry Co. 32
Central Oil & Supply Co. 3
Chester Steel Castings Co. 47
Chicago Bridge & Iron Co. 39
C., B. & Q. R. R. 35
C., C. C. & St. L. Ry. 15
C., R. & D. Ry. 35
C., M. & St. P. Ry. 35
C., R. I. & P. Ry. 15
Chicago & Alton R. R. 35
Chicago & N. W. Ry. 35
Church Co., John 12
Cleveland City Forge & Iron Co. 1
Cleveland Frog & Cross. Co. 27
Congdon Brake Shoe Co. 29
Connelly, J. T. 9
Consolidated Car Heating Co. 35
Cont. Rail Joint Co. of Amer. 35
Cooke Loco. & Mach. Co. 37
Copeland & Bacon 9
Creosote Lum. & Const. Co. 38
Croes, J. J. R. 13
Curtis Regulator Co. 9
Cushion Car Wheel Co. 32
Damascus Bronze Co. 36
Davenport & Fairbairn 29
De LaVergne Ref. Mach. Co. 16
Delaware Car Works 26
Detroit Bridge & Iron Wks 39
Detroit Lubricator Co. 41
De Voe, F. W., & Co. 1
Dickson Mfg. Co. 37
Dilworth, Porter & Co. 43
Dixon Crucible Co., Jos. 16
Drake & Weirs 30
Drexel Ry. Supply Co. 30
Dudgeon, Richard 9
Dudley & Co., W. W. 12
East. Gran. Roof Co. 16
Eckstein, C. G. & Co. 9
Edge Moor Bridge Works 39
Egan Co., The 9
Electric Secret Service Co. 14
Elliot Frog & Switch Co. 38
Elmira Bridge Co. 38
Employment 13
Engin. Employm. Bureau 13
Engineering Magazine 15
Eno Rail Joint Co 33
Ensign Mfg. Co. 26
Erie Car Works 36
Eureka Cast Steel Co. 11
Eureka Nut Lock Co. 41
Evans, Geo. A. 1, 13
Fairbanks, Morse & Co. 9
Falls Hollow Stay Bolt Co. 34
Farist Steel Co. 18
Fay, J. A. & Co. 8
Ferracute Machine Co. 8
Field Water Purifier Co. 10
Fisher Rail Joint Works 5
Fishkill Landing Mach. Co. 7
Fitchburg R. R. 35
Fitzgerald, S. C. 1
Flagg, Stanley G. & Co. 10
Flood & Conklin Co. 18
Fontaine Crossing Co. 34
Foos Mfg. Co. 17
Foster Engineering Co. 15
Fowler, Geo. L. 13
French Spring Co., A. 18
Frescoln, S. W. 41
Fuller Bros. & Co. 22
Gardner, O. K. 9
Gates Iron Wks. 10
Gilbert, Bradford L. 1
Gill-Alexander El. Mfg. Co. 18
Goff & Sons, D. 25
Gold Car Heating Co. 25
Goodwin, J. B. 6
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Lee Composite Mfg. Co. 21
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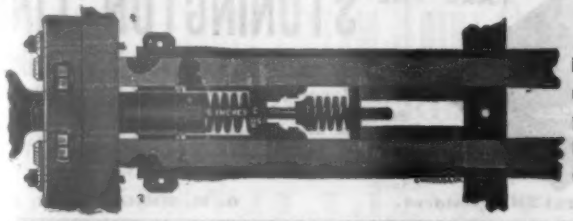

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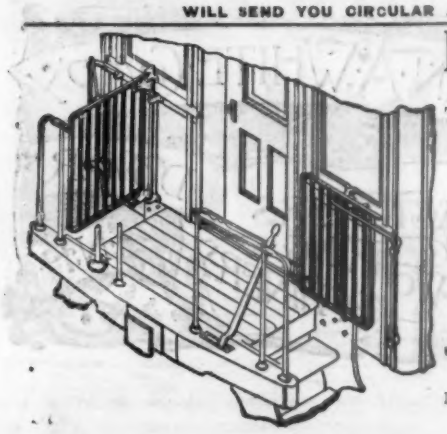

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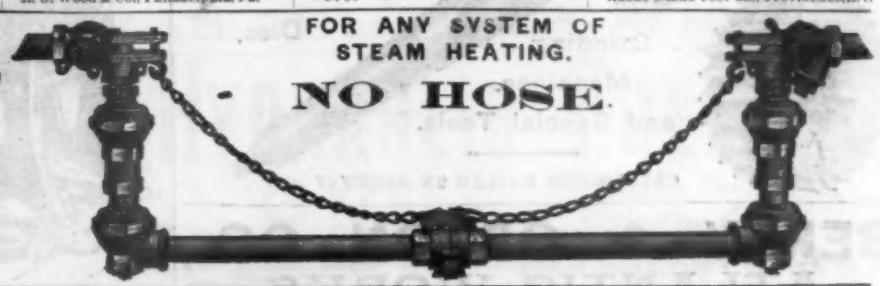

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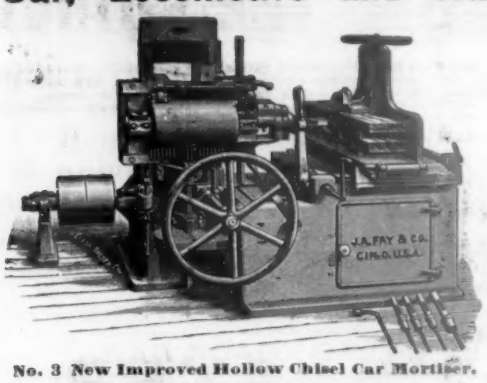

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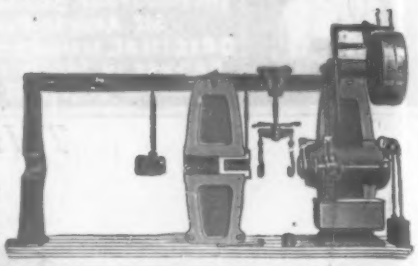

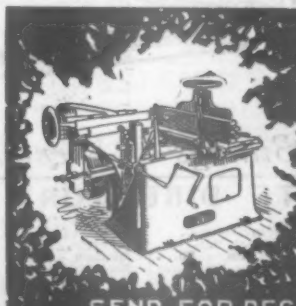

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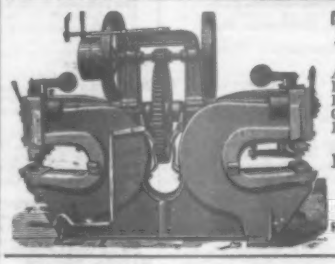

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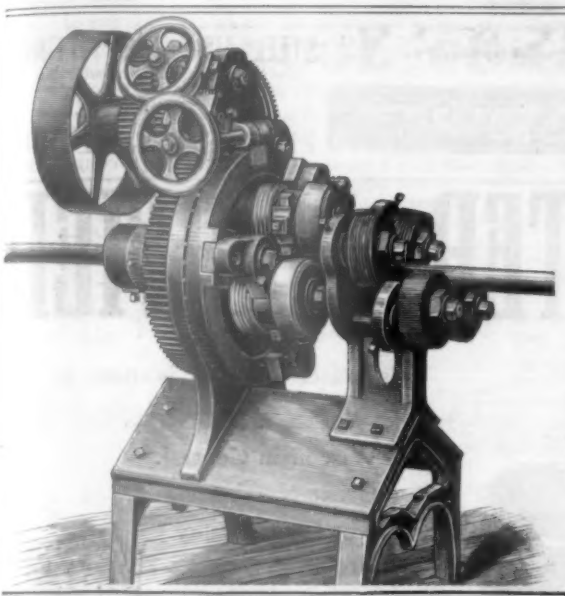

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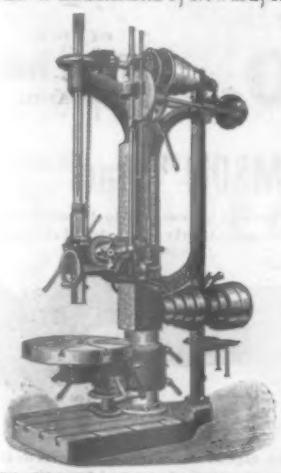

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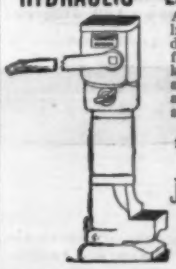

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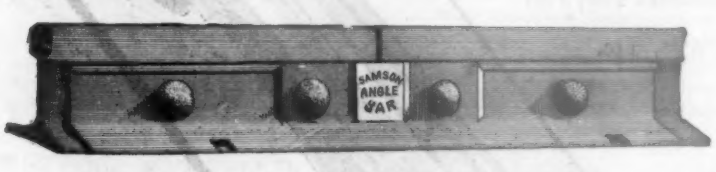

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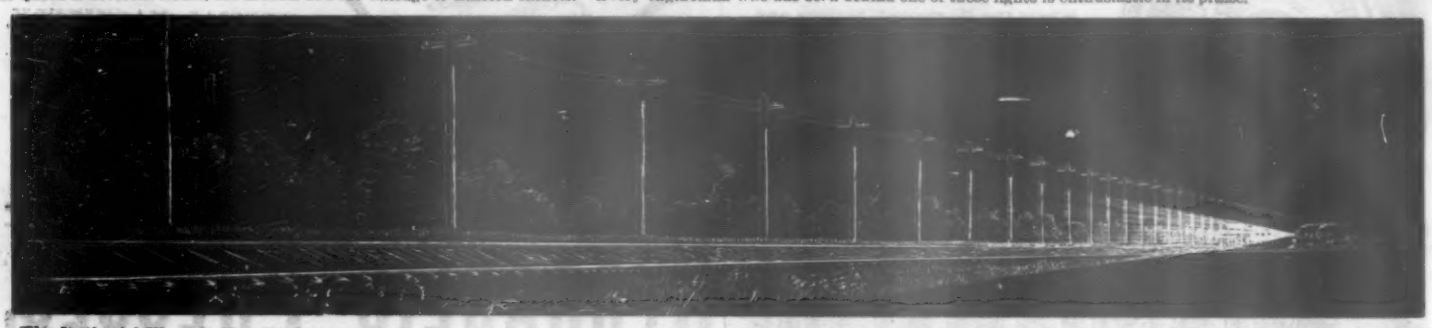

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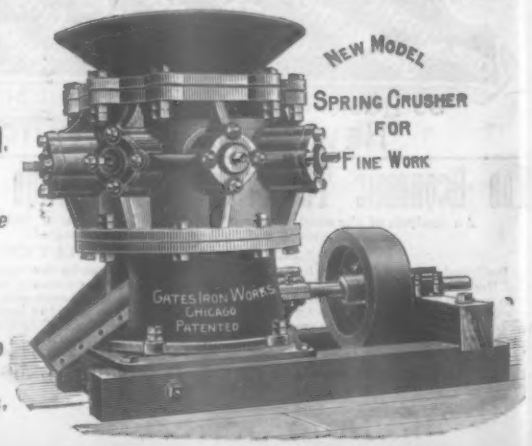

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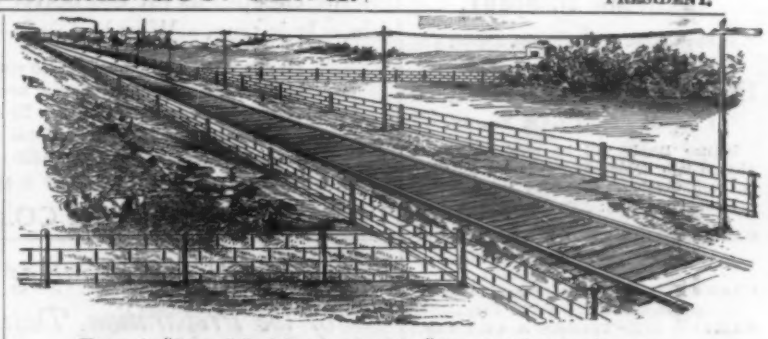

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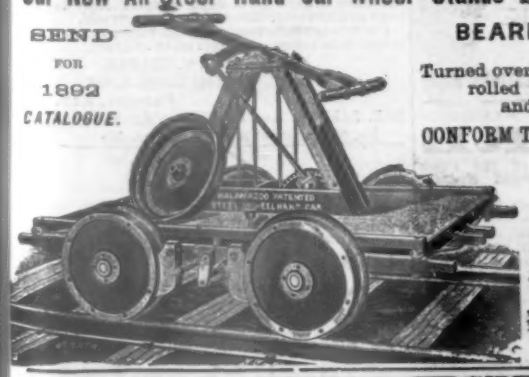

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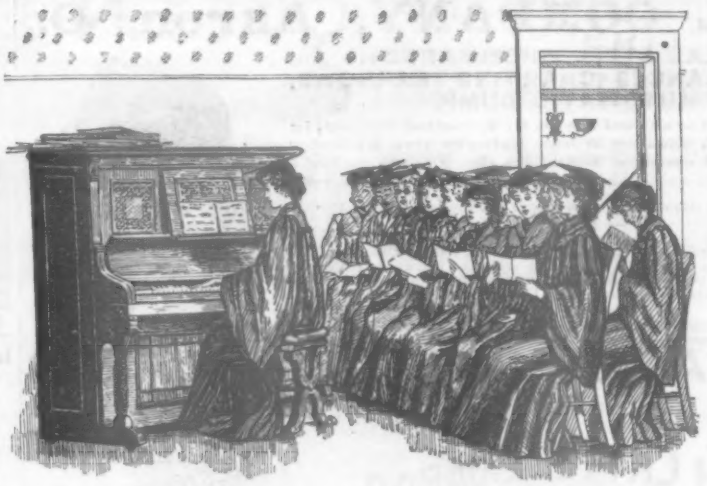

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PROPOSALS.

SANITARY DISTRICT OF CHICAGO.

TO CONTRACTORS.

Sealed proposals addressed to the Board of Trustees of the Sanitary District of Chicago, and indorsed:

"Proposals for Excavating the Main Drainage Channel" will be received by the clerk of said Sanitary district at Room H, Rialto Building, Chicago, Ill., until 12 M. (standard time) of Wednesday, the 19th day of October, 1892, and will be publicly opened by the said Board of Trustees at the regular meeting held that day, or at a special meeting called for that purpose.

The work for which the said tenders are invited is the excavation of the main drainage channel for the said sanitary district between Willow Springs and Summit, Ill.

Bids will be received on two propositions, designated as "Proposition 1" and "Proposition 2," respectively.

Under "Proposition 1" the said work will consist in all of the excavation of about 11,400,000 cubic yards of earth, and of about 500,000 cubic yards of rock, and the building of 40,000 cubic yards of dry rubble walls, and under "Proposition 2" it will consist in all of about 7,525,000 cubic yards of earth, of about 350,000 cubic yards of rock, and of 40,000 cubic yards of dry rubble walls.

Said work will be divided into six sections, each of which will be treated as a separate contract in canvassing the proposals and making awards. As all awards will be made by individual sections as provided in the specifications and forms of proposals to be furnished bidders, each bidder must make prices for each section, separate and distinct from every other. The lumping of prices in any bid will render such bid informal, and will cause its rejection by the said Board of Trustees.

As the question of which proposition will be acted upon will not be determined by the Board of Trustees until after the time set for receiving proposals, the bidder is allowed to make two alternative tenders, based upon the terms of the specifications for each of the two propositions respectively.

Each proposal must be accompanied by a certified check, or cash to an amount equal to $3,000 multiplied by the number of sections bid upon; provided that the said check or cash shall entitle the bidder to make tender under one or both of the said propositions.

All certified checks must be drawn on some responsible bank doing business in the city of Chicago, and be made payable to the order of the Clerk of the Sanitary District of Chicago. Said amount of $3,000 for each section will be held by the Sanitary District until all of said proposals have been canvassed and contracts awarded and signed, the return of said check or cash being conditioned upon any bidder to whom an award of any portion of said work may be made appearing within ten days after notice of such award being given, with bondsmen, and executing a contract with the Sanitary District for the section or sections of said work so awarded, and giving a bond satisfactory to the said Board of Trustees for the fulfillment of the same in the amount of $75,000 for each section of work awarded him.

All proposals must be made upon blank forms furnished by the Sanitary District, and must give the price for each separate item of work.

The bids will be compared on the basis of the engineer's approximate estimate of quantities, which will be furnished with copies of the specifications.

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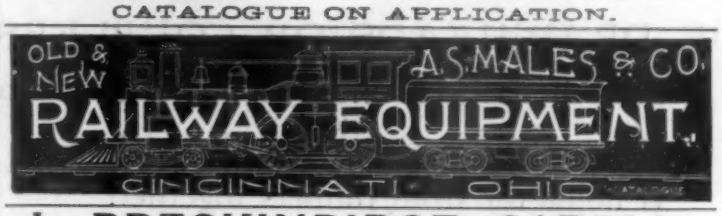

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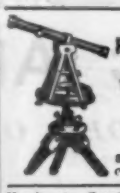

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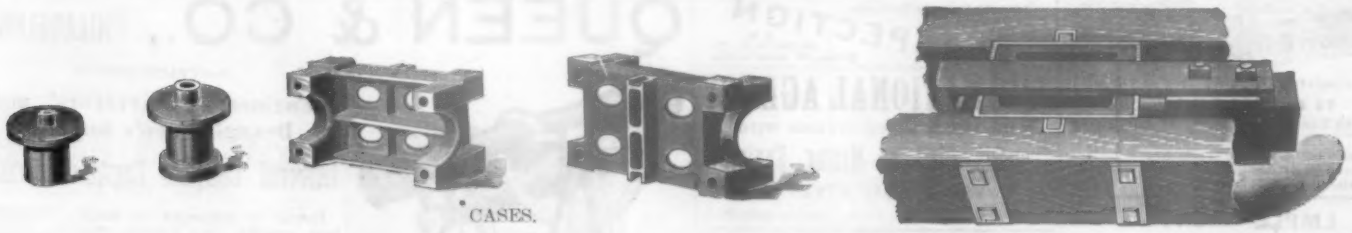

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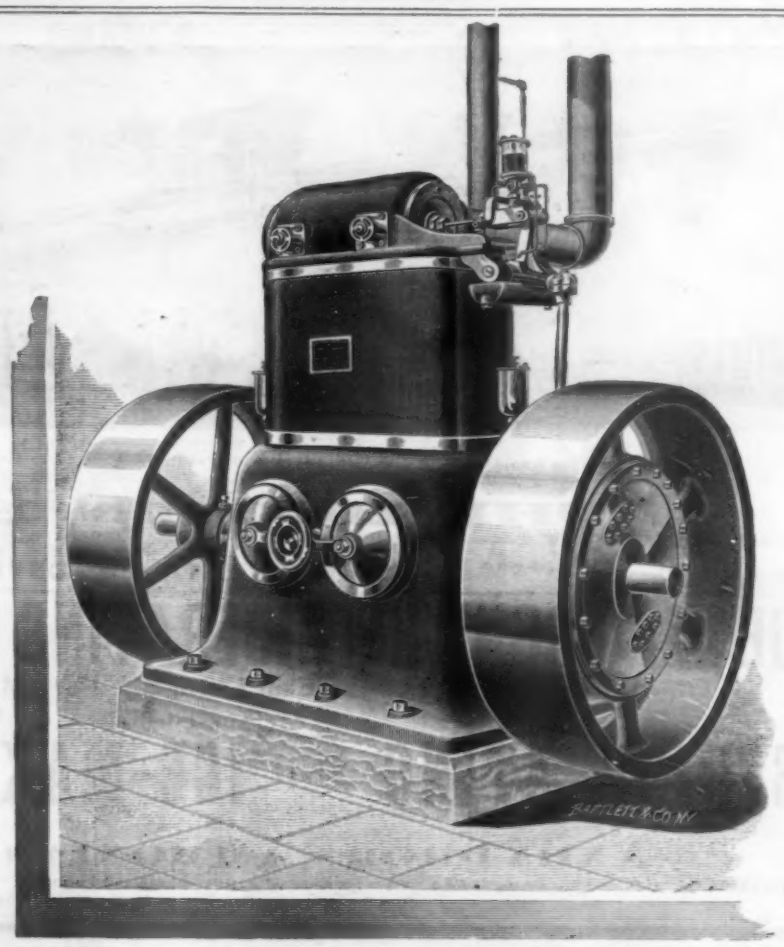

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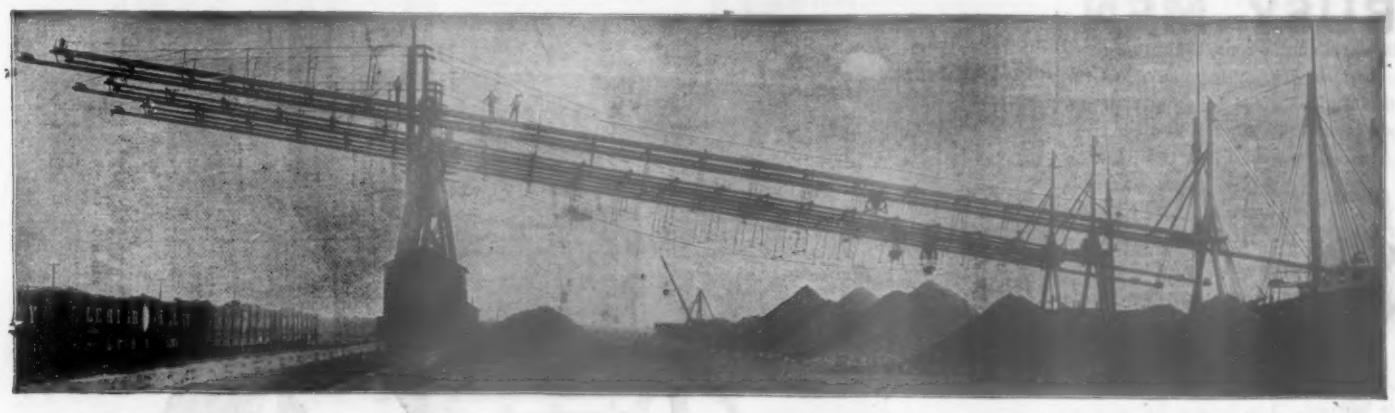

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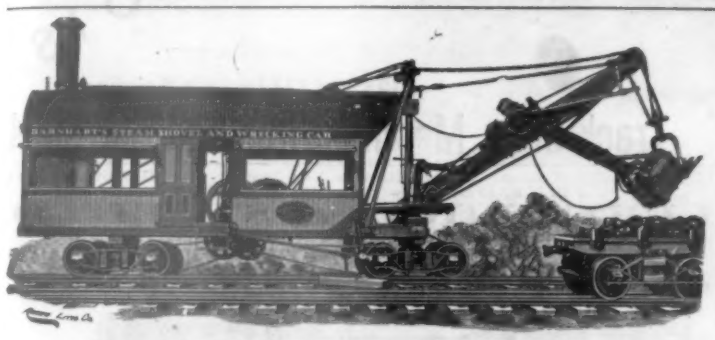

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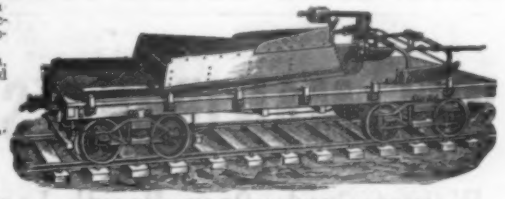

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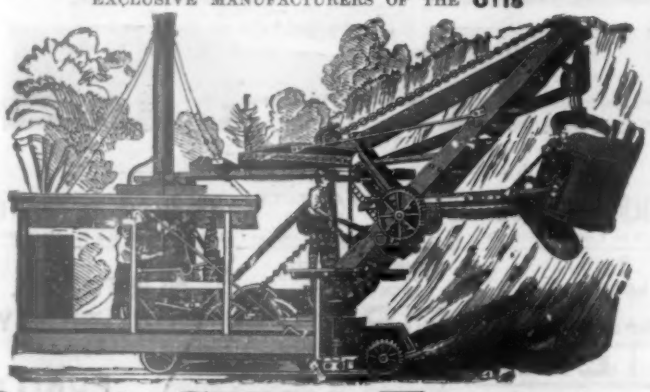

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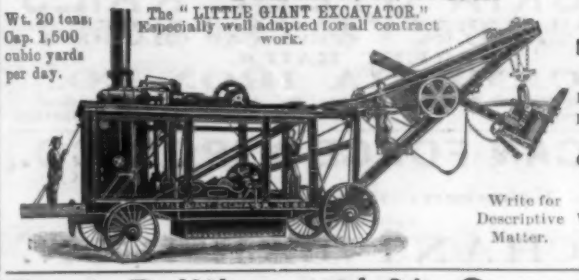

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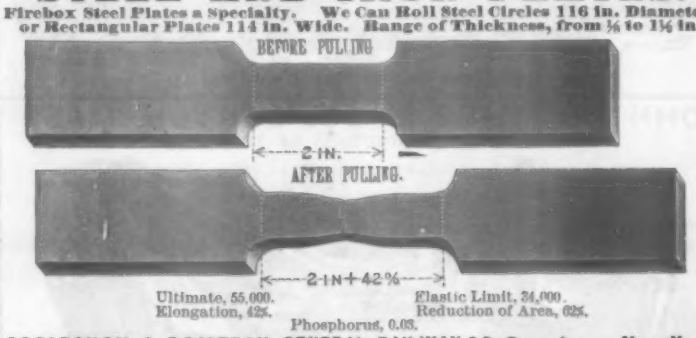

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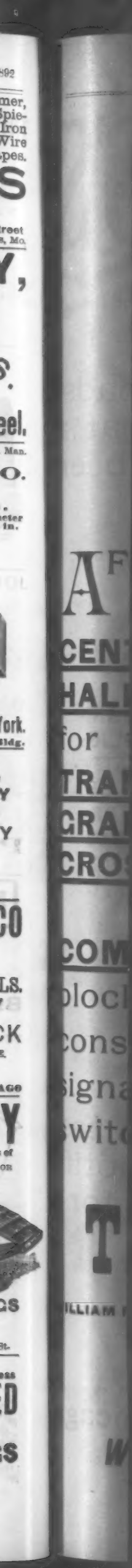

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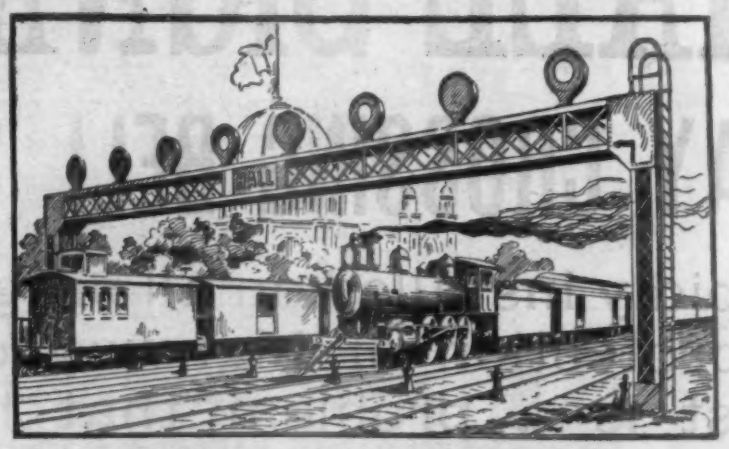

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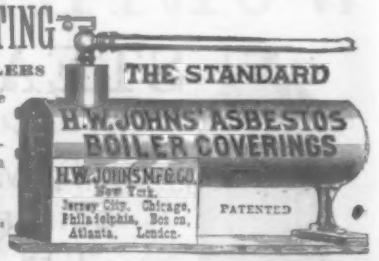

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FRIDAY, SEPT. 16.

CONTENTS.

ILLUSTRATIONS:	PAGE.
Lake Shore & Michigan Southern Passenger Car.	681
Pneumatic Interlocking Apparatus of the Wuerpel Switch & Signal Co.	683
Railroad Terminals at the World's Fair	684
Swiss Street Rack Railroad.	684
Steam-Driven Turntable	685
McKeen Coupler Substitute for Miller Hook	686
Guillemet's Brake Slack Adjuster	686
National Bolt Cutter with Lead Screw	687
Moran Flexible Water Joint for Locomotives	687
CONTRIBUTIONS:	
Toughened Steel Rails	679
Best Color for Signal Posts.	679
The Right to Hire Whom You Choose.	679
Spikes and the Servis Tie Plate	679
Variation in Braking Power Resulting from Different Brake Shoe Metals.	679
EDITORIALS:	
The Railroads and Cholera.	688
Cost of Renewals of Cross Ties.	688

EDITORIALS,	PAGE.
The New South Wales Engines Again	689
EDITORIAL NOTES	689
New Publications	690
Trade Catalogues	690
GENERAL NEWS:	
Car Building	693
Bridge Building	693
Railroad Law	693
Meetings and Announcements	693
Personal	694
Elections and Appointments	694
Railroad Construction	695
General Railroad News	695
Traffic	696
MISCELLANEOUS:	
Technical	691
The Scrap Heap	692
Air-Brake Tests	680
Victor Hugo on the Locomotive	686
Cost of Transportation by Rail and Water	687
The Transandine Railroad.	687
Anthracite Coal Tolls	689

Contributions.

Toughened Steel Rails.

CHICAGO, Ill., Sept. 7, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The article in your issue of Sept. 2, on "toughened" steel rails was a contribution to steel rail literature which I was glad to see, and I wish to express to Dr. White my thanks for the intelligent tests made by him. His inductions are so in harmony with my often expressed views that, of course, I believe him to be right. My opinions were formed after and upon extensive investigation, which I sought to keep unbiased.

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New York, Lake Erie and Western Railroad Co.,
JERSEY CITY, N. J., Sept. 8, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

During the last two or three years there has been a very widespread departure from the established practice as regards the color of signal posts. Before that time the almost universal practice was to paint the posts white, with the exception of about six feet at the base painted black. We now see signal posts painted various shades of brown, yellow, green or black, to suit various artistic tastes.

In my opinion this departure is entirely wrong, and to a certain extent dangerous. The principal point should be that of affording the enginemen a signal post which can be seen distinctly against backgrounds of various colors. White can be seen much more distinctly than any color, even when dirty, and when the posts are white the runner of a fast train approaching a signal round a curve is enabled to pick out his signal on the instant and can just as readily determine the angle which the arm makes with the post. In approaching junctions the runner of a fast train is, under some conditions, liable to pick out the wrong signal, if the relative location of the various signals at such a point is not clearly defined by white posts.

This is really a more important question than it would at first appear, especially when we consider that the semaphore post is really part of the semaphore signal, as it is the varying angle of one with the other which makes the signal distinctive.

ARTHUR H. JOHNSON,
Engr. Signals.

The Right to Hire Whom You Choose.

Boston & Albany Railroad Co.
BOSTON, Sept. 10, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I want to thank you in the name of all railroad men who have had my experience, for your editorial in the last issue of the *Gazette*, on "The Right to Hire Whom You Choose." I could tell you a long story of time and patience and money wasted in teaching or training men for important places, only to have them get drunk once or poss'bly more, and lose the place it cost so much to fit them for. I have tried to reform some of them, and have set them on their feet several times, but it has been of no use, and I am now of the opinion that there is no other way to do with a man who drinks but to get him off the railroad, and now I will not employ a man who drinks even moderately, if I know it.

Your editorial did not put the case half so strongly as the facts will bear, and it would do much good, I think, if you would some time print an article showing up in detail just how costly and vexatious it is to keep changing men because they drink, and are therefore not reliable. Besides the business reasons you give for the course you defended, I think there are moral ones even more imperative. I hope you will have the satisfaction to find that all candid railroad managers agree with you in principle, if not in detail, and that more important words of commendation will be given you for your course.

C. E.

Spikes and the Servis Tie Plate, etc.

The Q & C Company.
CHICAGO, Sept. 12, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We desire to extend our thanks for the careful and thorough inquiry which you instituted to determine the truth or falsehood of the charges which had been made concerning the shearing of the track spikes in connection with the Servis Tie Plates, as also to express our appreciation of your honorable course in taking editorial cognizance of the results of that inquiry in your issue of Sept. 2, thereby correcting the false impressions which the publication of the original charge tended to promote.

The report was by no means new to us for we had frequently been informed by different railroad officials that such charges were being made by a former representative of this company, who is now pushing the claims of a rival plate. In deference to the wishes of these officials giving us the above information, who for obvious reasons were averse to being drawn into such a controversy, we simply confined ourselves to a searching inquiry of the facts, and in every case they were found to be maliciously false, possessing not even a foundation of truth. Without exception these charges were traced to the same source.

It was the knowledge that there was no truth in these charges that led us to ask you for the particulars concerning time, place and circumstances of the reported failures which appear in your issue of July 8, 1892. Your reply proved that our conjectures were well founded, for the cases quoted were the identical ones which had been brought to our attention privately more than a dozen times.

We are always anxious to investigate any honest criticism and, if, possible, overcome any just complaint; we do not feel called upon to defend the Servis tie plate against these slanderous attacks and false statements. We also felt that the *Railroad Gazette* would investigate the matter and that the result would be, as time has proved it to be, a complete vindication.

While the result in this respect is all we could desire or ask, we feel it our duty to warn our patrons and those who are investigating the merits of any tie plate against further imposition and statements that are without the slightest particle of truth; and while we feel that the ultimate outcome of such contemptible methods must necessarily react, we would be derelict indeed to the interest of our customers, as well as unjust to those who are engaged in a serious investigation of the question, did we not make the following brief statement, which will suffice to fortify those who are interested against the methods used in the last few months to create impressions that are utterly false.

On the 9th day of February last the Chief Engineer of a prominent railroad system mailed a letter of inquiry to this company, addressed to a former representative, whose connection with this company, unknown to the official, had just been served.

When the letter was received at the New York office, it was sent by a messenger, to the party addressed, with a request that if it pertained to the business of the company, the letter be returned.

The reply came that the communication was purely personal. Upon investigation, and bringing the matter up to the writer of the letter, who showed us his impression copy, we find that it was directed to the company through this representative, and was in every sense a business letter which noted that the correspondent had noted accidents reported on the B. & O. and C., R. I. & P. railroads, because of the Servis tie plate, and wanted information concerning same, expressing fears concerning the use of the plate, should such reports be true. This letter of inquiry, which was originally written in a desire for information, was withheld from us, and has since been repeatedly exhibited as a statement of facts, voicing the sentiments of the writer as an evidence of the failure of the Servis tie plates. We have no comment to pass on the characterless methods above described, but will leave to your readers the determination of the value of such testimony.

THE Q & C CO.

Variation in Braking Power Resulting From Different Brake Shoe Metals.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I beg to call the attention of your readers to some of the results of using different kinds of brake shoe material. These results have been a surprise to me and they may be to others. On pages 59 to 70, inclusive, of the 1891 report of the Master Car Builders' Association, will be found some valuable information given by Mr. G. W. Rhodes. The data there given is accompanied by six diagrams. A careful study of these diagrams gives several important deductions.

In the first place they show how greatly the friction is affected by the heating of the shoes. It is surprising how the heat has one effect on one kind of a shoe and a directly opposite effect on another kind.

In the first diagram, showing the result of a hard cast iron shoe on a chilled wheel the friction or tangential pull increased gradually for three minutes, beginning at 50 lbs. and rising to about 76 lbs., and then remained practically constant throughout the remainder of the test, which in every case was continued for 10 minutes.

Diagram No. 2 (malleable iron shoe on chilled wheel) shows a very similar result varying only in the fact that the maximum friction was not reached for four minutes, and was not quite as high as in the case of the hard cast iron shoe.

Diagram No. 3 is rather contradictory. This one is for a wrought iron shoe on chilled wheel with the fibre parallel with the tread. The first two tests show an increase in the first two minutes from 80 to about 90 lbs., whereas, the third test of this set begins at 110 lbs., and gradually decreases to about 83 at the end of the ninth minute. All three, however, agree in general in showing a gradual falling off in friction after the second minute, due probably to a hardening effect of the heat on the surface of the shoe.

Diagram No. 4 is probably the most striking of all. It is for a medium cast iron shoe on a chilled wheel. The general result indicates a very sudden reduction of friction after the end of the first minute decreasing the second minute from about 95 to the neighborhood of 70 lbs. Diagram No. 6 is for a soft cast iron shoe on a chilled wheel. The friction begins at about 100 lbs. and decreases toward the end of the test, falling in the first minute from 100 to 86 lbs., the decrease after that being much more gradual.

Several very puzzling questions arise. Do we want a shoe that increases in friction with an increase of heat, or do we want one that gives the greatest braking power at the beginning of the application and then gradually decreases in frictional resistance on becoming heated? How far can we sacrifice holding power to durability, or is there any shoe that has both qualities in a high degree? What effect, if any, does the speed of contact have on the friction?

In a patent issued to George Westinghouse April 15, 1879, we find the following: "To ascertain if possible the laws governing the action of the various forces brought into play by the use of brakes, I had made a special brake vehicle fitted with self-recording apparatus to register at each instant, first, the force with which the wheels were pressed by the brake shoe; second, the amount of resistance or drag between the shoes and wheels; third, the weight with which the wheels pressed the rails; fourth, the exact rate of speed of the vehicle; fifth, the rate of rotation of the braked wheels. With this special vehicle and recording apparatus over 300 sets of diagrams were obtained. From these diagrams was found among many important things, first, that the friction between the shoes and wheels varied greatly, being very little at high speeds and gradually increasing as the train decreased in speed; second, that if more than a sufficient force were applied to the shoes the wheels would suddenly cease to rotate and continue sliding upon the rails until the brake force was almost entirely released; third, that the retarding effect with the wheels sliding upon the rails was less than *one-third* of that obtainable if the wheels were prevented from sliding; fourth, that on the same kind of rails, whatever the speed of the train, the wheels began to slide when the friction between the shoes and wheels reached a certain percentage of the load of the wheels upon the rails, and that this percentage was nearly constant upon all conditions of rails if sand was used; fifth, that the friction between the brakeshoes and wheels, with the train running at a uniform speed, lessened very considerably, according to the length of time the shoes were in contact with the wheels. These various facts rendered it very desirable in order to secure the very best results to provide a *great* brake force at *high* speed, and to automatically regulate this force against the shoes by the friction or drag of the shoes."

The above answers very clearly some of the questions that have arisen in relation to this subject. Since the friction at high speed is very little, compared to what it becomes as the speed is reduced, the wheels are not as apt to slide while running at a high rate of speed as they are after the speed has been reduced, and it would seem a rational conclusion that it is good policy to make the shoe of that material which gives the greatest braking power in the beginning of the application and which decreases by the heat as the train loses speed, rather than adopt a shoe that increases in retarding force with an increase of heat. In other words, as a decrease in speed of rotation increases the holding power of the brakes, would it not be rational to conclude that this increase should be in some degree offset or counteracted by the use of a shoe that has a high initial breaking power, but loses in friction as the heat becomes more intense from a continuous application?

The question now arises whether this will also hold good for roads having long and steep grades, where the brakes must be held on continuously for many miles. At first glance it would appear that to have the shoes gradually decrease in braking power as they become heated would be very bad for grade work; but let us look at this more carefully, in relation to the action of the brake itself. In the first place, this decrease only

continues to a certain point and thereafter the friction remains practically constant. Also, we know from repeated experiments and from actual practice that from leakage in the trainpipe air brakes when, lightly applied, will gradually creep on harder, finally reaching full equalization pressure. In view of this it is not likely that any bad effects on grades would follow from the loss of friction through heating of the shoe.

Again, in case of emergency, the all-important thing is to check the high rate of speed as soon as possible and to prevent the wheels from sliding. In order to make the very quickest stop, it is necessary to have a brake that will take hold with full power almost immediately on application, but will so reduce in retarding force with the reduction in speed that the wheels will not slide during the latter part of the stop; for, as we noted in the statement by Mr. Westinghouse, "The retarding effect with the wheels sliding upon the rails in less than *one-third* that obtainable if the wheels were prevented from sliding."

The following table gives briefly the general averages obtained from the tests cited. In giving it I wish to acknowledge my indebtedness to Mr. F. W. Sargent, who conducted the brake shoe tests I have quoted, while occupying the position of Engineer of Tests on the Chicago, Burlington & Quincy.

The apparatus used was illustrated in the *Railroad Gazette* May 30, 1890; it consisted of a wheel 11⅛ in. in diameter; shoes, 4 in. by 1 in., under a load of 400 lbs. The speed of contact was about 20 miles an hour.

Shoe.	Steel tired wheel.	Cast iron wheel.
Cast iron (soft)	50.4	79.5
Cast iron (medium)	49.2	74.3
Cast iron (hard)	68.1	72.6
Cast and wrought and soft cast iron with wrought iron pieces	61.4	86.8

The above figures represent the friction or tangential pull in pounds. It will be noted immediately that there is a great difference between the steel tired and chilled cast wheel, and we may now very profitably study the effect of the omission of a considerstion of this on the uniformity of braking power. What would be the result on an air braked train with an engine at each end, each engine controlling half of the brakes, if one engine were to carry the standard, 70 lbs. of pressure, while the other one carried 119 lbs.? Suppose that they should make an application while running at a high rate of speed. The result can readily be imagined. Or, to put it in another way, suppose that in applying the brake levers to a car a leverage or braking power of 90 per cent. were put on one truck and about 150 per cent. on the other, would any one be surprised if the wheels on one of the trucks were repeatedly flattened? Yet according to the result of the above experiments, that would be an exactly equivalent condition to having steel tired wheels on one end of the car and chilled wheels on the other, soft cast iron shoes being used against the steel wheels and shoes with wrought iron pieces against the chilled wheels. While of course this condition does not exist exactly as described, as the wheels and shoes under the same car are generally uniform, still it is not at all infrequent that such a difference exists between different cars in the same train. Possibly, here is a solution of the question why wheels so often slide under one car in a train and not under another.

During my experience on railroads my attention was repeatedly called to the fact that the wheels under a certain class of cars were continually being slid, while those under another class having exactly the same percentage of brake power, as far as leverage was concerned, were seldom or almost never slid, and it is only since studying the subject now under discussion that I have satisfied myself as to the reason. The first class of cars had all chilled wheels and shoes of cast iron with wrought pieces because of their great durability. The other class had all steel tired wheels and on these plain soft cast iron shoes were always used because of the danger of cutting the tire by a shoe of mixed material. A reference to the table given above will show that the ratio of the friction of the shoes on the cars of the first class was to that of the shoes on the cars of the second class as 50.4 is to 86.8; or one was nearly 1¾ times that of the other. No one who sees this can be more astonished than I was when I reached this conclusion. In view of the importance of the subject and of the ignorance of most of our railroad men concerning it, it is to be hoped that the tests recommended by the committee in their report will be carried out at an early day, and I believe that all concerned will be much interested in learning just how far exhaustive practical tests will confirm the astonishing results obtained in the laboratory.

PAUL SYNNESTVEDT.

Standard Passenger Car Lake Shore & Michigan Southern.

The standard passenger car of the Lake Shore & Michigan Southern Railroad has some features not usually found in car construction. The principal feature of the car is the composite wood and iron end framing, and the composite end and side sills. In the engravings, figs. 1 to 4 show elevations, section and plan of the standard car. Figs. 5 to 7 show the details of construction for the composite end framing.

The side sills consist of three pieces *A*, *M*, *N*, figs. 2, 5, 7; an outside sill *N* of the usual size, 5 in. × 8 in. an inside piece *M*, 2 in. × 8 in. and between the two is placed an iron plate *A* ½ in. × 7⅝ in. by 14 ft. long. The whole is securely bolted together. The side sill *N*, fig. 7, is further reinforced its full length between the composite ends with a 2½ in. × 7⅝ in. piece of timber *O*, making with the composite ends, a side sill of unusual strength. The end of the iron plate (*A*, figs. 2, 5, 7), in the side sill is bent at a right angle, and is bolted to the end sill. The end sill is composed of two pieces of timber (*B* and *C* figs. 6 and 7), being respectively 4½ in. × 8¼ in. and 3½ in. × 8¼ in., with a ⅝ in. × 8 in. iron plate (*F*, fig. 6 and 7) between them.

The end framing of the car consists of the ordinary wooden end and door posts and corner posts, to the sides of each being securely bolted an iron end post (*D*, figs. 5 and 6) ¾ × 3½ in., together with an auxiliary post (*E*, figs. 5 and 6) placed outside the iron posts, *D*. These iron end posts are twisted at each end and are bolted at their lower ends to the iron plate (*F*, fig. 7) of the end sill, and at their upper ends to a similar iron plate (*G*, fig. 5) ⅝ × 4 in., reinforcing the end plate. The ends of this iron plate (*G*, fig. 5) are bent at right angles and lie upon the ends of the side plates, to which it is also bolted.

This whole construction has great resisting power to telescoping either by engines or cars. It is considered that composite framing does as much for safety as any device now used in passenger car construction with our present section of car, results in wrecks confirming this opinion in quite a number of instances. This construction was first used by the Wagner Sleeping Car Co. in its sleeping cars; it was then put on two private cars. The Lake Shore & Michigan Southern first applied it to four 60 ft. postal cars, and are now specifying the composite construction for all new passenger equipment of all kinds. It is the intention, in these cars, to make the floor framing exceptionally strong where the shocks come, as this company believe that this point more than any other is the part to be made strong.

These standard passenger cars are all provided with a lavatory. The heater is inclosed in a heater room of the same general appearance as the saloon, except that the doors have blind slats in them to permit of free circulation of air.

The following are some general dimensions of the cars: Length of car body over sills, 52 ft.: width of car body over all, 9 ft. 8 in.: height from floor to head-lining of clerestory, 9 ft. 8⅝ in.; height from bottom of sill to top of roof, 10 ft. 6¼ in.

Duluth & Winnipeg Ore Docks.

The ore docks of this company, at Allouez Bay, Superior, Wis., are now nearly finished. All that remains to be done is a small amount of planking, although the docks are now practically ready to receive ore. The citizens of Duluth are preparing for a celebration to be held when the first carload of ore from the Mesabe range is received.

Air Brake Trials.

The comparative trials of the Westinghouse and the New York air brakes, which we announced last week, were held according to programme on Thursday, Friday and Saturday, at Karners, just west of West Albany, on the line of the New York Central. The weather was magnificent—clear, dry and not too warm—and so far the conditions were singularly fortunate. The arrangements of the test also were such as to secure entire impartiality. The whole matter was a private enterprise of the New York Central Railroad and was put absolutely into the hands of Mr. P. H. Dudley. The manufacturers of the brakes were at liberty to make suggestions and to watch the experiments, but were not allowed to touch their material or to have anything to do with the tests other than as spectators. They were not even permitted to have representatives on the engines, although their representatives were allowed in the rear cars of the trains.

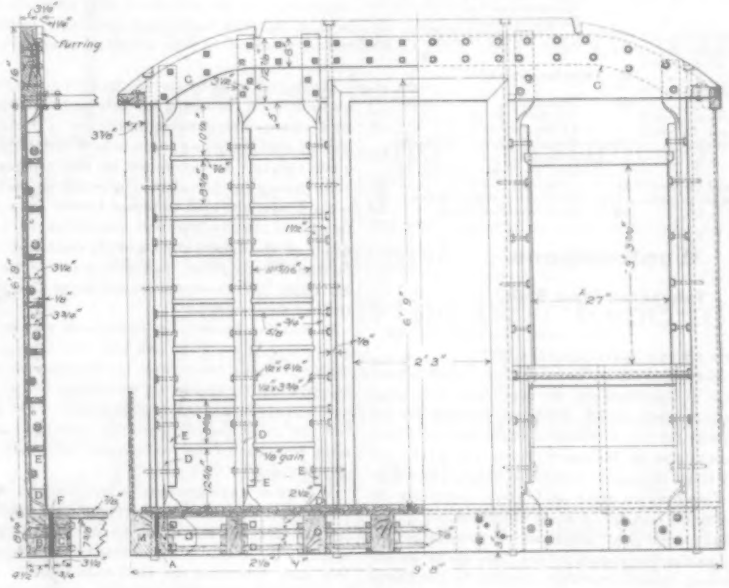


Fig. 6. Fig. 5.

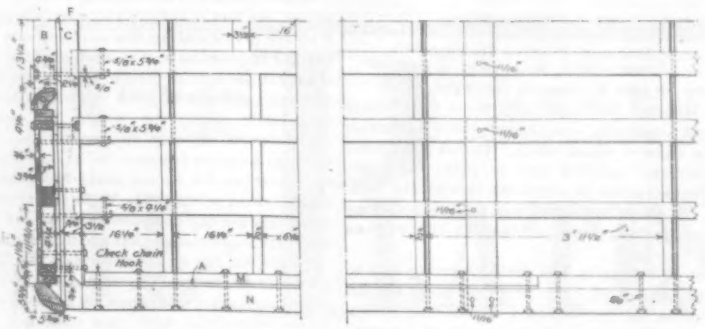


Fig. 7.

The programme of the tests, which was previously prepared by Mr. Dudley, follows.

Tests to be practically the same as recommended by the Committee on Air Brakes of the M. C. B. Association.

Condition of Tests.—Fifty car trains; train line pressure, 70 lbs.; piston travel, 5 to 7 in.

Standing Tests.—Locomotive and dynagraph car to be side by side on parallel tracks; 25 cars attached to the locomotive and 25 to the dynagraph car; the air hose of the 25 and 26 connected; the first and fiftieth cars connected by air pipes to the instruments in the dynagraph car.

Running Tests.—One train of 50 cars will be placed on track No. 3 and the other on track No. 4, then run side by side from Athens Junction to Karners, at same speed. Locomotives shut off at signal post. Air automatically applied by tripping block.

Schedule of Tests—Train Line.

1. Train charged with 70 lbs. of air. All brakes cut out. Pump shut off. Record of pressure to be taken at end of five minutes.

2. Train line recharged to 70 lbs. Service application to see time required for reduction of train line pressure from first to fiftieth car.

3. All brakes cut in. Time of reduction in pressure of train line from first to fiftieth car. Service application and release.

NOTE.—Service application to be 20 lbs. reduction in train pipe.

4. Same as No. 3, except emergency application.

NOTE.—Handle of engineer's valve in emergency notch one second—for emergency application.

5. Time of development of pressure in cylinders from first to fiftieth car. Service application and release.

6. Same as No. 5 Emergency application and release. Repeated three times.

7. Time of development of pressure in cylinders, the 5th, 6th, and 7th cars cut out. Emergency application and release.

Repeated three times.

8. (Special and optional.)

Same as No. 7, except the 5th to the 10th car inclusive, cut out.

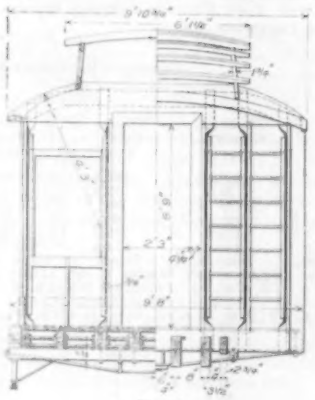


Fig. 3.

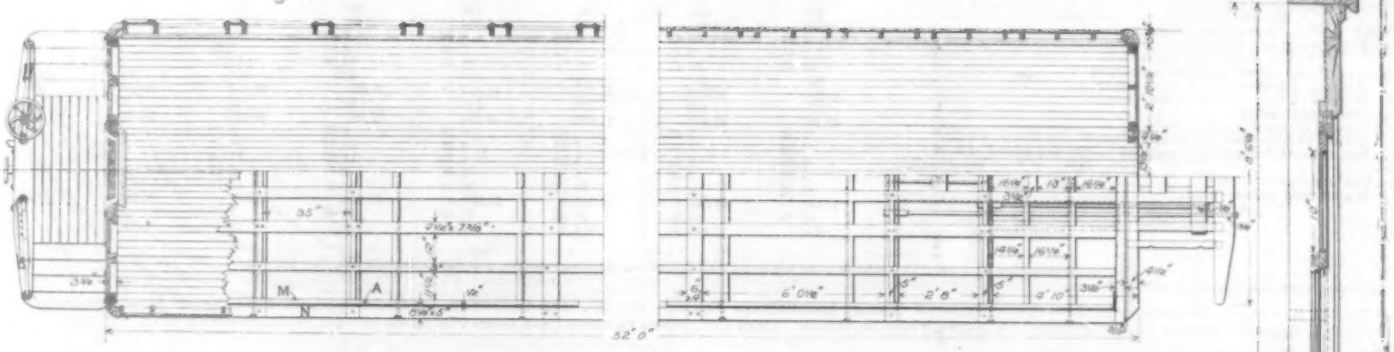


Fig. 2.

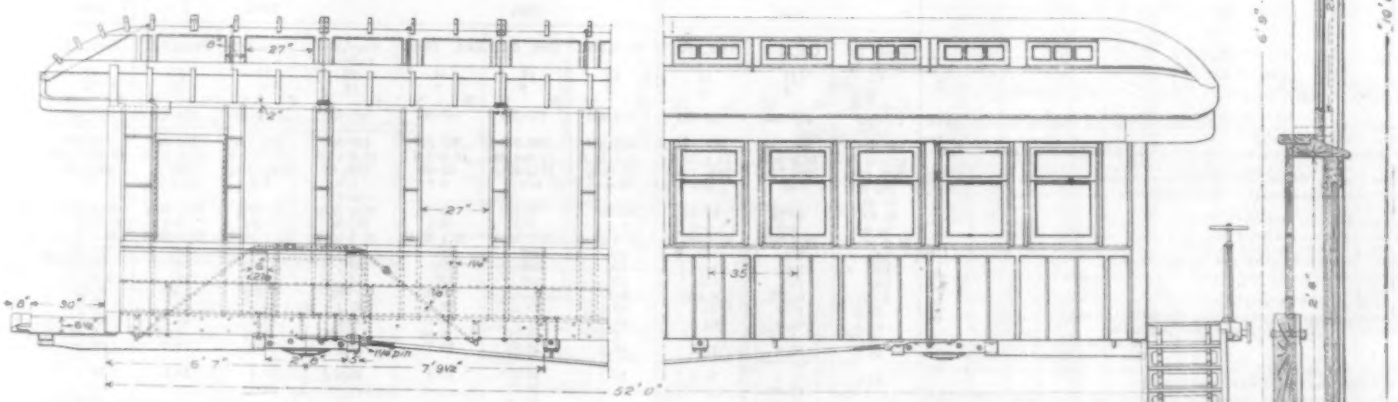


Fig. 1.

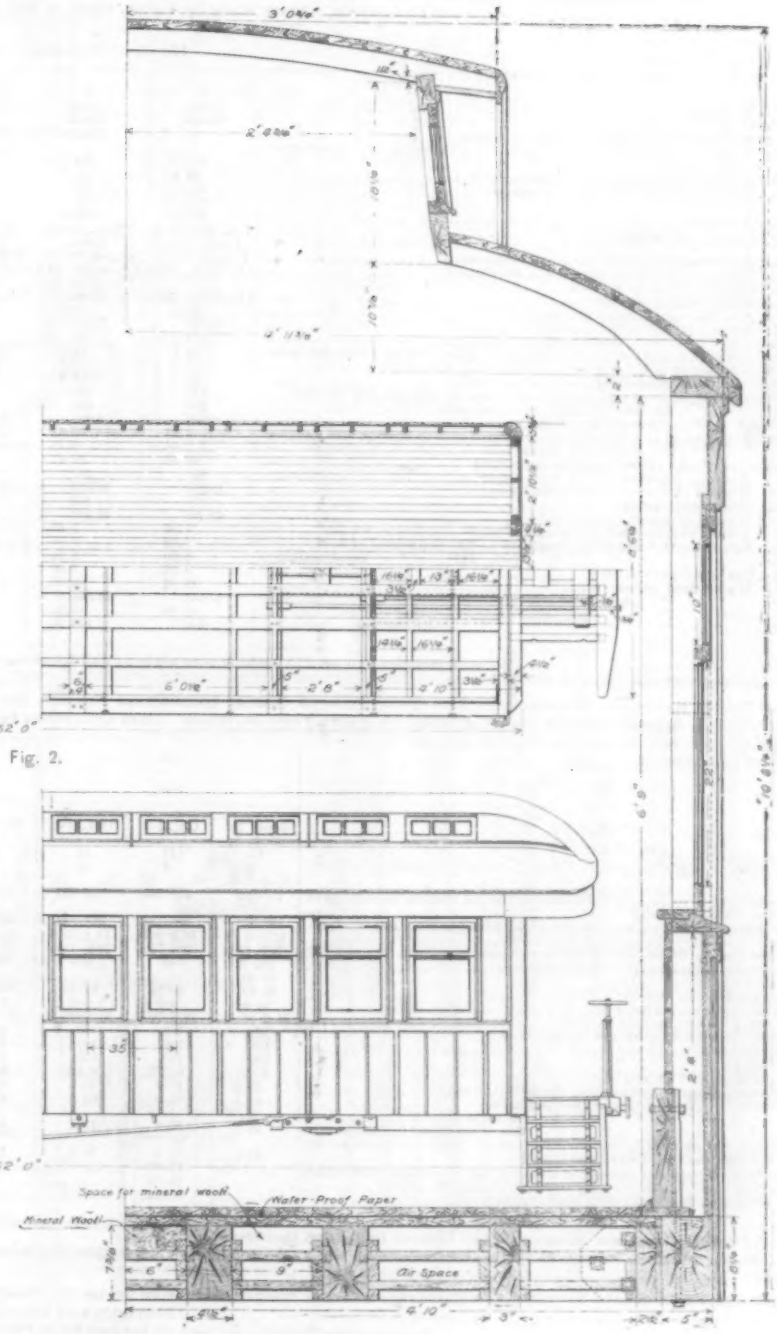


Fig. 4.

STANDARD PASSENGER CAR—LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

Graduation Tests.

9. A reduction of 8 lbs. in train line pressure will be made; then at one minute intervals, further reductions of 4 to 6 lbs. to be made until reservoirs and cylinders are equalized.

Repeated twice.

10. Service application.

Fifteen pounds to be admitted into cylinders, pressure noted then at the 5th, 10th and 15th minutes.

11. Same as No. 10, except *all the air* to be exhausted from train line by emergency application.

Release Test.

Boiler pressure, 160 lbs.

12. Seventy pounds. In train line all the air will be discharged by an emergency application. A pressure of 90 lbs. will then be maintained against a diaphragm ⅛ of an inch thick, perforated with a 3-32 hole, and a record taken of all brakes which release in 30 minutes.

Test to determine the sensitiveness of the emergency valve.

13. The 1st and 50th car will be cut from train and hose connected. Seventy pounds train pipe pressure will then be discharged through a diaphragm perforated with a 5-32 hole. Each car to be tested singly, if desired.

14. Tests to determine time of charging one auxiliary reservoir. Cars arranged as in test No. 13. Cut out brakes, bleed reservoirs. Secure 90 lbs. pressure in main air reservoir and train line. Shut off pump. Note time of charging reservoir to 70 lbs.

This programme was carefully adhered to, except that the standing tests of the Westinghouse brake could not be made on Thursday and were put over till Saturday—that is, the standing tests of the New York brake were made on Thursday, the running tests of the two brakes on Friday, and the standing tests of the Westinghouse on Saturday. There were not many people present to see the tests, as they were carried on very quietly, and no previous general announcement had been made. From the New York Central, Mr. Voorhees, Mr. Buchanan, Mr. Harrington and several other officers were present, and there were a number of air brake inspectors from other roads. The Westinghouse and New York companies had a good many of their men on the ground.

We are not permitted to give out any of the results or anything that would indicate what the results are until Mr. Dudley shall have prepared his official report; an arrangement which everybody ought to accept very willingly, for it insures a careful compilation and analysis of the unusually full records that were made. No such analysis will be possible till all of the dynagraph records are collected and presented; and those records will be more complete than any notes taken by watches and from gauges alone could be. However, we may describe somewhat the arrangements for conducting the trials.

For the standing tests, a train of 50 cars was placed on two tracks; the locomotive and 25 cars on one track, then 25 cars and Mr. Dudley's dynagraph car on the other track, the locomotive and dynagraph car being side by side, and the sections of the train being connected by a cross-over between the twenty-fifth and twenty-sixth cars. These cars were taken out of service after having run for several months, and the triple valves and cylinders were not touched before the trials. The aim was to secure service conditions. The New York Central people simply examined and tightened up the train line, but left other parts without cleaning or oiling, or any other attention whatever.

On the first, the twenty-fifth and fiftieth cars were gauges connected with the cylinder, the reservoir and train-pipe. Connection was established from the same parts on the first and fiftieth cars directly to the registering apparatus in Mr. Dudley's car. Here use was made of the dynagraph. A continuous sheet of paper was run out from the dynagraph, on which was recorded one line of seconds and one line of 10 seconds for convenience in counting. Above and below these lines were recorded the curves of pressure in the cylinders of the first and the fiftieth cars. The movements of the engineer's valve were also shown on the dynagraph sheet. The result was that the instant of application on each car could be precisely determined; also the curves of pressure could be accurately compared. The characteristics of the curves of the Westinghouse and New York air brakes, which differ somewhat, will be graphically shown. In addition to this record the gauges on the three cars were read by observers and recorded.

The trains were divided into sections of 10 cars each, each section having five cars on one track and five on the other, and each of these sections was watched by an observer, who recorded the circumstances of brakes going on or failing to go on, and facts concerning their release as well as any other events which he could observe.

For the running tests, arrangements were made for the automatic application of the brakes and for recording in the dynagraph car the instant of brake application, the speed before this application and the curves of retardation. As will be seen from the schedule of tests, the trains were run side by side, simultaneously. A white flag was suspended over the tracks to indicate the point for shutting off steam and applying brakes. Under this flag were placed, beside the tracks, blocks which tripped a lever, which released the cock in the train-pipe which was pulled open by a spiral spring, so that the discharge of the air was made exactly at the same point for both trains, and was independent of the personal equation of the engineman or other factors of uncertainty. For several hundred feet along the tracks there were arranged contact instruments at intervals of 88 ft. or one-sixtieth of a mile. These were connected by wires with the recording apparatus in the dynagraph car, and the results were that the speeds of

OLD COLONY RAILROAD—RESULTS OF TESTS OF SIMPLE LOCOMOTIVE 235 AND COMPOUND LOCOMOTIVE 232 ON THE NEW YORK EXPRESS FREIGHT, BETWEEN BOSTON AND FALL RIVER. TESTS MADE ON ROUND TRIPS, 98 MILES, OCTOBER, NOVEMBER, DECEMBER, 1891.

	Simple (O. C. standard) locomotive No. 235.				Compound locomotive No. 232.			
	1.	2.	3.	4.	1.	2.	3.	4.
1. Weather	Clear.	Clear.	Clear.	Clear.	Cloudy.	Clear.	Clear.	Clear.
2. Condition of rail	Good.	Good.	Good.	Good.	Slippery.	Good.	Good.	Good.
3. Size of exhaust nozzle, single or double		Single, 4¾ in. diam.				Single, 4¼ in. diam.		
4. Weight of train in tons of 2,000 lbs., excluding the locomotive and tender	366.6	404.2	385.4	394.8	385.4	357.2	404.2	413.6
5. Average number of cars on round trip	19.5	21.5	20.5	21.0	20.5	19.0	21.5	22.0
6. Maximum boiler pressure by gauge	174	172	174	172	190	185	185	185
7. Minimum " "	149	140	136	130	160	160	160	155
8. Average " "	160 6	159.0	159.4	156.2	176.4	175.5	173.7	171.3
9. Prevailing points of cut-off	7 in. and 10 in.	7-min. 10 sec.	7 in. and 10 in.	7 in. and 10 in.	12 in.	12 in.	12 in.	12 in.
10. Time made up in minutes	5 min. 7 sec.	None.	2 min. 35 sec.	11 min. 43 sec.	None.	None.	1 min. 5 sec.	1 min. 45 sec.
11. Aggregate intermediate stops, minutes	13 min. 7 sec.	43 min. 33 sec.	19 min. 35 sec.	1 h. 14 m. 8 s.	8 min. 50 sec.	10 min. 15 sec.	14 min. 5 sec.	11 min. 55 sec.
12. Time during which power was developed	2 h. 31 m. 33 s.	2 h. 55 m. 49 s.	2 h. 42 m. 29 s.	2 h. 43 m. 57 s.	2 h. 43 m. 9 s.	2 h. 42 m. 39 s.	2 h. 45 m. 5 s.	2 h. 45 m. 30 s.
13. Schedule time in motion		3 h. 48 m. 0 s.				3 hrs 48 min.		
14. Actual time in motion	3 h. 42 m. 53 s.	3 h. 49 m. 27 s.	3 h. 42 m. 25 s.	3 h. 36 m. 17 s.	3 h. 56 m. 55 s.	3 h. 48 m. 15 s.	3 h. 46 m. 55 s.	3 h. 46 m. 15 s.
15. Average speed, miles per hour	26.5	25.7	26.5	27.2	25.5	25.8	26.0	26.0
16. Actual weight of coal used	6,798	7,046	5,681	6,333	4,253	4,351	4,897	4,736
17. " wood used	350	350	400	400	400	400	400	400
18. Average weight of coal burned per square foot of grate per hour	96.4	97.1	80.8	92.6	58.3	60.3	69.2	66.1
19. Number of miles run per ton (2,000 lbs.) of coal	28.9	27.8	34.5	31.0	46.2	45.1	40.2	41.1
20. " pounds of coal used per mile	69.3	71.9	58.0	64.6	43.4	44.4	49.9	48.3
21. Weight of ashes and unconsumed coal in ash pan and firebox	438	461	355	363	377	503	364	414
22. " cinders or sparks in smokebox	303	440	344	196	200	254	220	198
23. " combustible utilized	6,112	6,285	5,942	5,934	3,836	3,754	4,473	4,284
24. Percentage of ashes and unconsumed coal in firebox and ashpan	6.24	6.41	6.08	5.80	8.54	11.15	7.2	8.46
25. " " cinders in smokebox	5.66	6.12	4.17	3.02	4.53	5.63	4.35	4.04
26. " combustible consumed	88.10	87.47	89.75	91.38	86.90	83.20	88.40	87.50
27. Average temperature of feed water	60°	58°	59°	57°	53°	57°	55°	55°
28. Weight of water drawn from tender	43,375	46,625	41,750	42,874	37,635	36,750	39,194	38,500
29. Waste of injector	150	143	130	111	98	85	98	104
30. Weight of water evaporated	43,225	46,482	41,620	42,764	37,527	36,665	39,097	38,396
31. Actual evaporation per pound of coal	6.36	6.59	7.32	6.75	8.83	8.43	7.97	8.11
32. Equivalent evaporation from and at 212° per pound of coal	7.69	7.97	8.85	8.16	10.74	10.22	9.68	9.85
33. " " " " 212° " combustible	8.55	8.94	9.60	8.72	11.93	11 86	10.58	10.88
34. Coal used per car mile	3.56	3.68	2.82	3.08	2.11	2.33	2.33	2.19
35. Water used per car mile	22.62	22.06	20.71	20.78	18.68	19.70	18.51	17.81
36. " " hour while developing power	17,152.7	15,864.2	15,414.8	15,064.4	13,848	13,529	14,140	13,911
37. " " " per square foot of heating surface	11.84	10.95	10.64	10.82	10.22	9.99	10.44	10.27
38. " " " " " grate surface	902.7	834.9	811.3	824.4	728.8	712.0	744.2	732.1

Coal used includes that used in banking over night at Fall River. Average saving per car mile over 235, 31.8 per cent.

OLD COLONY RAILROAD.—STATEMENT OF RESULTS OF TESTS OF SIMPLE LOCOMOTIVES NOS. 148 AND 229, AND COMPOUND LOCOMOTIVE 232, ON FALL RIVER LINE STEAMBOAT TRAIN BETWEEN BOSTON AND FALL RIVER ON ROUND TRIPS (100 MILES). COAL QUANTITIES INCLUDE COAL USED FOR BANKING FIRE IN FALL RIVER OVER NIGHTS.

No. of locomotive	148.			229.			232 Compound.			148.*	232.*
Yea	1890.			1890.			1892.			1889.	1892.
Date	Sept. 30-Oct. 1.	Oct. 1-2	Oct. 2-3.	Oc t.5-6.	Oct. 6-7.	Oct. 11-12.	May 31-June 1.	June 1-2.	June 2-3.	Nov. 17.	May 22.
No. of cars South	11	11	11	12	11	10	12	11	11	12	12
" North	9	9	10	9	9	9	11	10	10	12	12
	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.
Weight of train in tons (2,000 lbs.) including engine, tender, pass. and freight	477-390	477-389	479-433	479-433	477-399	443-397	542-490	491-450	488 436	457-457	467-476
Weight of train in tons (2,000 lbs.) excluding engine and tender	396-318	396-318	398-352	398-352	396-318	362-316	450-397	398-359	396-344	376-376	384-384
Equiv. number of cars of 33 tons each	12.0-9.64	12.0-9.64	12.1-10.6	12.1-10.6	12.0-9.64	11.0-9.6	13.6-12.1	12.0-10.9	12.0-10.4	11.39-11.39	11.65-11.65
Time during which power was developed, minutes	70¾-61¼	73¼-74¼	74¾-71½	63-69¼	71¼-67½	68-60	68¾-68	67¾-68¼	72¾-72	61¼-62	57¼-61
Aggregate intermediate stops, minutes	6¼-0	6-0	0-0	0-0	0-0	0-0	0-0	0-2	33¼-3½	0-1	0-0
Schedule time in motion	86-80						85-85				
Actual time in motion	86-80	89-84	91-85	86-80	85-78	83-79	82¼-81¼	84-82½	90¼-89¾	65¼-65¼	65¾-69¼
Time made up, minutes	¼-0	0-0	0-0	0-0	0-2	0-1	2¼-¾	1-2¼	0-0	0-0	0-0
Average speed, miles per hour	34.9-37.5	33.7-35.7	31.5-35.3	34.9-37.5	35.3-38.5	36.1-37.9	36.3-35.6	35.7-36.3	33.1-33.4	40.4-40.5	40.1-38.1
Maximum boiler pressure, by gauge	162.	160.	160.	160.	160.	160.	185.	191.	191.	180-178	185-188
Minimum " "	128.	121.	124.	126.	120.	130.	131.	165	161.	126-123	165-130
Average " "	150.	150.	150.	155.	158.	150.	177.	182.	183.	159.1	177.0
Actual weight of coal used	6,753	6,256	6,407	6,897	6,712	6,676	5,390	4,880	4,685	7,455	5,213
Number of miles run per ton (2,000 lbs.) of coal	29.6	31.9	31.2	29.0	29.8	29.9	37.1	40.9	42.7	33.6	33.8
Number of pounds of coal used per mile	67.5	62.5	64.0	68.9	67.1	66.7	53.9	48.8	46.8	84.7	59.2
" " " " car mile	6.24	5.78	5.64	6.07	6.21	6.50	4.21	4.26	4.18	7.44	5.08
" " " " ton of train per 100 miles	18.9	17.5	17.1	18 4	18.8	19.7	12.7	12.9	12.6	22.52	15.42
Number of pounds of coal used per ton of train per 100 miles, including the locomotive and tender	15.4	14.3	14 1	15.1	16.0	15.9	10.4	10.4	10.1	18.5	12.4
Average number of pounds of coal per ton of train per 100 miles		17.83			18.97			12.7			
Saving of 232 lbs. of coal per ton of train per 100 miles		28.7%			33.1%					31.8%	
Average saving of 232 over both engines		30.9%									

* Two special test trips, 12 cars each day, between Boston and Providence.

NOTE.—Minimum steam pressure readings were taken when approaching terminal stations and were intentionally low.

OLD COLONY RAILROAD.—STATEMENT OF RESULTS OF TESTS OF SIMPLE LOCOMOTIVE NO. 148 AND COMPOUND LOCOMOTIVE NO. 232, ON SHORE LINE EXPRESS TRAIN, BETWEEN BOSTON AND PROVIDENCE ON ROUND TRIPS.

Coal quantities include coal used for banking fire in Providence. Length of round trips, 88 miles.

	Simple, 148, O. C. Standard.—1889.						Compound, 232.—1892.					
	Nov. 2.	Nov. 4.	Nov. 5.	Nov. 6.	Nov. 7.	Nov. 8.	May 19.	May 21.	May 25.	May 26.	May 27.	May 28.
	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.	S. N.
Weight of train in tons (2,000 lbs.), including engine, tender, passenger and freight	260 254	255 261	262 250	252 260	262 251	252 264	280 258	290 300	294 257	284 261	284 258	284 266
Weight of train in tons (2,000 lbs.), excluding engine and tender	179 173	174 180	181 169	171 179	181 170	171 183	188 166	188 198	202 165	192 169	192 166	192 174
Equivalent number of cars of 33 tons each	5.42 5 24	5.27 5.45	5.48 5.12	5.18 5.42	5.48 5.15	5.18 5.54	5.69 5.03	5.69 5.09	6.12 5.00	5.81 5.11	5.81 5.03	5.81 5.27
Time during which power was developed...minutes	54¾ 53	49¾ 52½	53¼ 53¾	54¼ 53¼	49¼ 49	51 50	53¼ 53¼	53¼ ?	51¾ 55¼	51¼ 52¾	53½ 53¼	53 55½
Aggregate intermediate stops "	¾ 2¾	2¾ 3¾	¾ 1¾	1 3	1¼ 1¾	1 1½	¾ 1¾	1¼ ?	1¼ 9¾	1¼ 5	¾ 3	2 3¼
Schedule time in motion "	64¼ 67¼						67¼ 67¼					
Actual time " "	64¼ 67¼	59¼ 62½	63½ 66½	62¼ 62¼	62½ 60	63½ 61¼	66¾ 68	68¼ ?	66 61¾	66 62¾	66¼ 66½	66¼ 66¼
Time made up "	0 0	5 4⅝	¾ ¾	2 5	1¾ 7¼	¾ 6	½ 0	0 ?	1¼ 4½	1¼ 5½	1 ¾	1 1
Average speed, miles per hour	41.1 39.3	44.6 42.3	41.5 39.7	42.3 42.4	42.3 44.0	41.6 43.1	39.5 38.8	38.7 ?	40.0 42.7	40.0 42.1	39 8 39.9	39.9 39.9
Maximum boiler pressure, by gauge	155 145	146 145	148 141	156 139	166 172	182 180	186.	182.	190.	190.	187.	184.
Minimum " " "	135 128	133 132	135 130	138 140	138 149	163 143	167.	146.	160.	145.	150.	147.
Average " " "	140.0	138.7	138.6	150.0	159.0	170.7	180.	181.	182.	180.	181.	178.
Actual weight of coal used	5,019.	4,928.	4,275.	4,718.	4,683.	4,701.	3,279.	3,517.	3,681.	3,417.	3,223.	3,338.
Number of miles run per ton (2,000 lbs.) of coal	35.7	35.3	41.1	37.3	37.6	37.4	53.9	50.0	47.7	51.5	54.6	52.7
Number of pounds of coal used per mile	57 0	56.0	48.6	53.2	53.2	53.4	37.2	39.9	41.8	39.8	36.6	37.9
" " " " car mile	10.70	10.42	9.16	10.00	10.00	9.97	6.95	7.41	7.46	7.11	6.76	6.84
" " " " ton of train, per 100 miles	32.40	31.63	27.76	30.32	30.32	30.18	21.0	22.4	22.6	21.51	20.46	20.73
Number of pounds of coal used per ton of train, per 100 miles, including the locomotive and tender	22.2	21.7	19.0	20.9	20.7	20.7	13.8	14.8	15.2	14.2	13.5	13.8
Average number pounds coal, per ton of train, per 100 miles	30.49						21.45					
Saving of 232 over 148 per ton of train, per 100 miles	29.6%											

NOTE.—Minimum steam pressure readings were taken when approaching terminal stations, and were intentionally low.

the trains were recorded electrically to a nicety. Some fine stops were made, but both trains broke in two repeatedly, in all cases from failure of couplers. In one case the couplers uncoupled without breaking; in another the drawbar was broken in the shank and in the others the steel knuckles broke.

The Dean Compound.

We publish on this page three tables giving the comparative results obtained with the Dean two-cylinder compound locomotive, and with certain simple locomotives on the Old Colony Railroad. The trials were made it will be seen, with express passenger and express freight service, the speeds in the freight trials being from 25½ to 27 miles an hour. Some of the data contained in these tables were published in our issue of May 27. The data collected are so full that the results will doubtless be a useful addition to the literature of the compound locomotive, and, therefore, we publish the tables in full. The dimensions of the engines are given in the table below:

Engine.	Nos. 148, 229, 235.	Compound No. 232.
Diameter of boiler	52 in.	55 in.
Grate surface	19.2 sq. ft.	19.2 sq. ft.
Number of 2-in. tubes	211	215
Heating surface	1,373 sq. ft.	1,354 sq. ft.
Diameter of cylinders	18 in.	20 in. and 28 in.
Stroke of pistons	24 "	24 "
Diameter of driving wheels	69 "	69 "
Travel of valves	5 "	6½ "
Lap " "	⅞ "	1 "
Inside clearance of valves	0 "	⅛ "
Lead of valves	1/32 "	1/32 "

We learn that very satisfactory results have been got from the Dean compound in suburban service, with trains making frequent stops and running at high speeds between stations, and we hope soon to be able to present some data from those tests.

The Buffalo Grade Crossing Problem.

Messrs. E. L. Corthell and A. W. Locke, the special consulting engineers appointed in July, made their report last Tuesday on the grade crossings question. They favor an elevated union terminal for both freight and passenger business, and estimate the expense at about $10,000,000. Commissioner of Public Works George S. Field also made a report. He does not dissent from the others' views, but declares their plans impracticable under the conditions as existing at present.

The Wuerpel Pneumatic Interlocking Machine.

The Wuerpel Switch & Signal Co., of St. Louis, the organization of which was recently noted in the *Railroad Gazette*, has erected an interlocking plant for certain switches near the east end of the Union station in St. Louis, a plan of which is shown in the accompanying drawing, fig. 1. These switches are near the entrance to the tunnel leading from the Union station to the bridge over the Mississippi, and these lines, as our readers know, are those of the Terminal Railroad Association, which operates the Union Depot, the Bridge Railroad, and other lines.

The apparatus used with these switches and signals has been designed by Mr. M. Wuerpel, who has been for several years connected with the Bridge Railroad. Some of the devices are new and others are adaptations of apparatus heretofore in use, a system of interlocking involving the use of electricity, hydraulic and automatic power having been in use at East St. Louis since 1882.

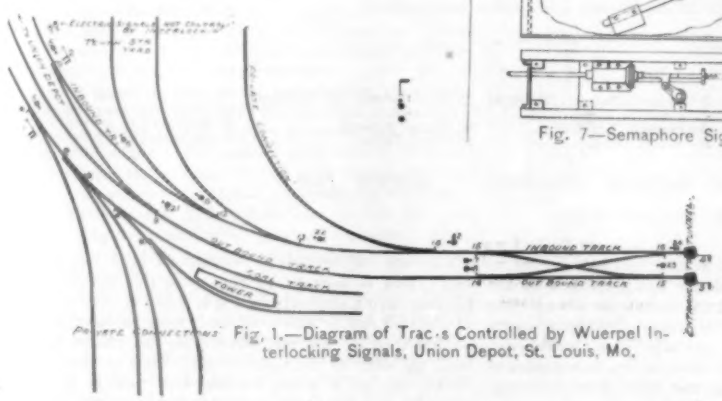


Fig. 1.—Diagram of Tracks Controlled by Wuerpel Interlocking Signals, Union Depot, St. Louis, Mo.

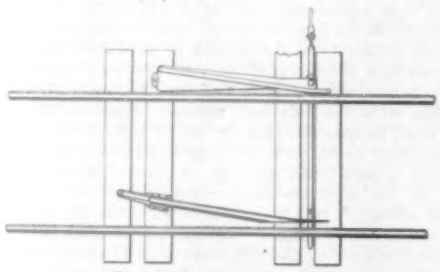


Fig. 9—Derailing Switch.

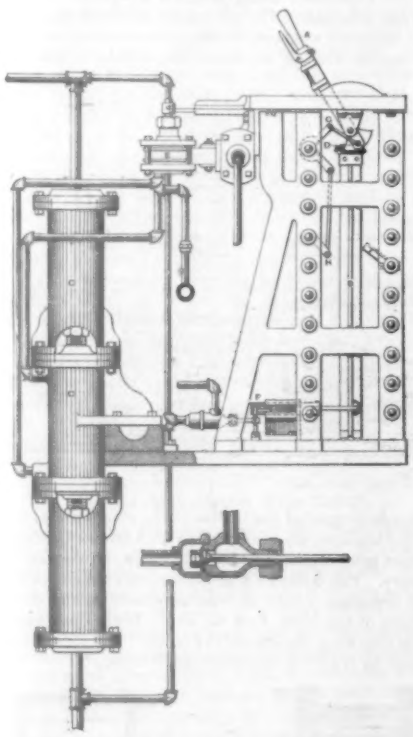


Fig. 2.—Side Elevation of Interlocking Frame.

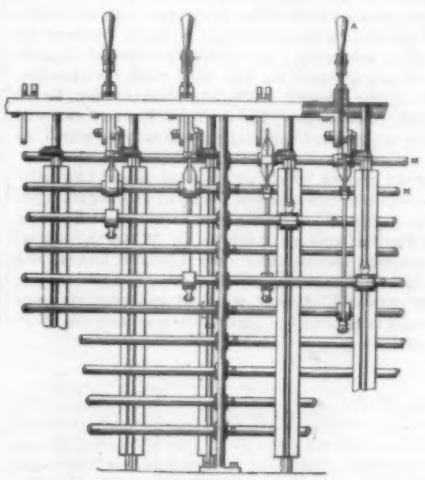


Fig. 3.—Section of Front Elevation of Interlocking Frame.

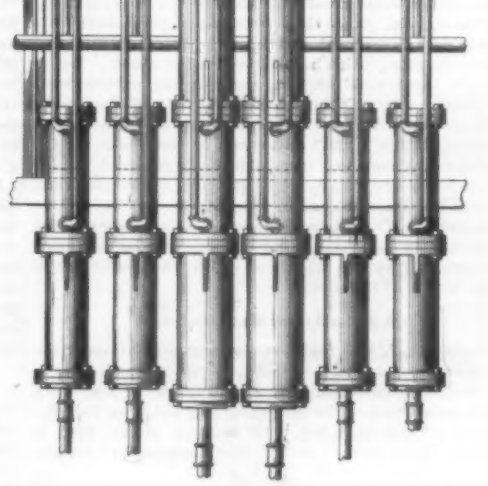


Fig. 4.—Section of Rear Elevation of Interlocking Frame.

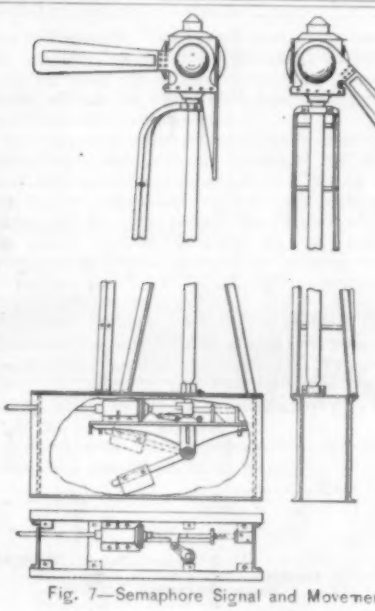


Fig. 7—Semaphore Signal and Movement.

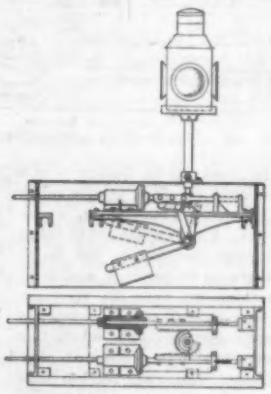
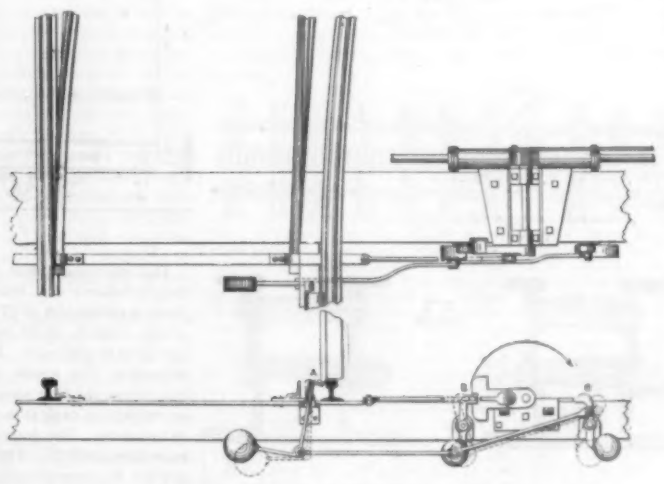


Fig. 8.—Dwarf Signal.



Figs. 5 and 6.—Switch Movement.

PNEUMATIC INTERLOCKING APPARATUS AND SIGNALS OF THE WUERPEL SWITCH AND SIGNAL COMPANY.

Fig. 2 shows the side elevation of a section of the interlocking frame. Each switch or signal is moved by a lever like *A*, which actuates the switch or signal by means of the vertical rod *B*, which controls a valve admitting compressed air from the reservoir to the cylinder *C*. The rod *B* is revolved by means of the bevel gear *D*. This actuates the valve *E*, by means of the connection at *F*.

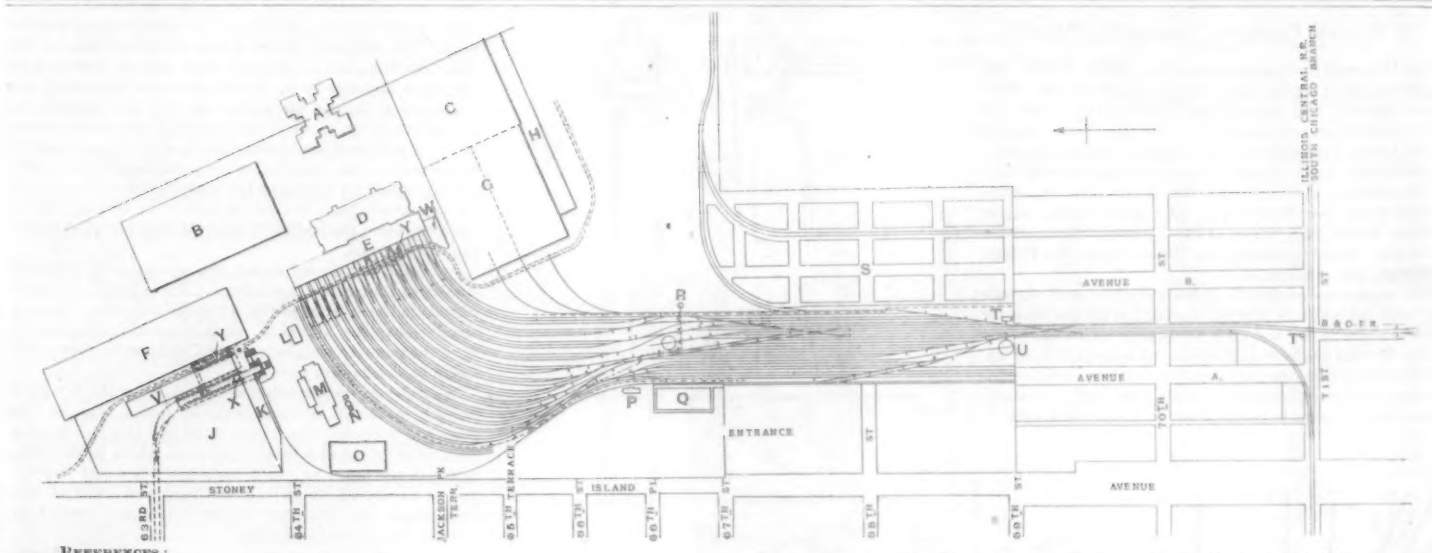
Fig. 3 shows a front elevation of the interlocking frame. The horizontal rods *M*, *N*, etc., are actuated by the lever *A* through the connection shown at *G H* in fig. 2. Fig. 4 is a rear elevation of the interlocking frame. Fig. 5 shows the switch movement. Fig. 6 gives another view of a switch movement showing the detector bar and facing point lock, the view of the latter at *A*, *B* and *C* being self-explanatory. Fig. 7 shows the semaphore used by the Wuerpel Co. The arm and the lamp are fixed rigidly to the vertical post, which is of iron, and is revolved on its axis to operate the signal. The right-hand figure shows the semaphore in the all-clear position as it appears to an approaching engineman. The left-hand figure shows the same signal in the same position, but as viewed by a person standing on the track opposite to it. It will be seen that there are two fixed arms, one for safety and one for danger, the revolution of the vertical rod throwing one or the other of them into position in accordance with the movement of the lever. The drawing shows the mode of operating the signal by means of the mechanism in the box at the foot of the post, the side of which is broken out in the drawing. Immediately beneath this is a plan of the same apparatus.

Fig. 8 shows a dwarf signal, the operation of which is similar to that of the semaphore. The signal movement shown in fig. 8 is, however, a double one, there being a pipe to move the signal in each direction, whereas in fig. 7 the counter weight is depended upon to throw the signal to the danger position.

Fig. 9 shows the derailing switch used by the Wuerpel Co., which, it will be seen, is made on the plan of the Wharton switch. The right hand rail (for throwing a train to the right of a main track), is, when in position, on top of the main or stock rail, and when out of position it is drawn entirely away from and clear of the main track, so that the latter when the switch is "closed" is entirely unbroken.

The interlocking machine at station X, St. Louis (shown in fig. 1) has 24 levers, of which six are idle. The power used is compressed air, but the parts are arranged for the use of steam if desired. There is a switch board on the operator's table on which, by models, the movement of each switch is repeated, and some of the switches are fitted with electric bells which ring continuously while they are turned off from the main track. This machine controls 28 routes. There are at this place about 200 train movements.

The Wuerpel Company will use the apparatus here described in executing its contract for signaling the terminal tracks in the World's Fair grounds at Chicago.



REFERENCES:
A—Administration.
B—Mines.
C—Machinery.
D—Railroad Station.
E—Train Shed.
F—Transportation.
G—Machinery Annex.
H—Boiler House.
J—Transportation Annex.
K—Vanderbilt R. R. Exhibit.
L—Hygeia.
M—Penna. R. R. Exhibit.
N—U. S. Wind Eng. & Pump Co.
O—Cold Storage.
P—Signal Tower, Wuerpel Switch & Signal Co.
Q—Bonded Warehouse.
R—Water Tank.
S—Warehouses for Packing-Cases.
T—Signal Towers.
U—Turn-Table.
V—Transfer Table.
W—Fire and Guard Station.
X—Elevated R. R. Station.
Y—Intramural Ry. Station.

WORLD'S COLUMBIAN EXPOSITION—PLAN OF RAILROAD TERMINALS AT JACKSON PARK.

NOTE—*Centre lines of tracks shown.*

The Railroad Terminals at the World's Fair Grounds

In the *Railroad Gazette* of May 27, 1892, we published a general plan of the World's Fair Grounds showing the arrangement of terminal facilities at that time. It was expected that the Pan Handle, Ft. Wayne and Lake Shore railroads would have a joint depot in the southeast corner of the grounds distinct from the general terminal station. Since that time many plans have been proposed and rejected, but the plans illustrated in this issue are those which have been adopted finally. Referring to the general drawing showing the arrangement of tracks, on which the centre lines only of the tracks are shown, it will be seen that they are arranged in groups of three with the exception of the tracks on the northern side of the station, which are reserved for the Lake Shore and Pennsylvania systems. These tracks are, it will be seen, arranged in pairs at the request of these companies. The Wuerpel Switch & Signal Co. have the contract for the interlocking system. All roads entering the grounds use the tracks of either the Baltimore & Ohio or the Illinois Central.

A Swiss Street Rack Railroad.

Since Oct. 1, 1889, there has been in regular operation in Switzerland, a narrow-gauge street railroad, worthy of special attention because it is fitted up in part with rack rails which, up to that time, had not been used for street railroad purposes. Our account of this road is drawn chiefly from a recent French pamphlet* supplemented by additional particulars and illustrations obtained from Mr. O. Sand, of Teufen, Switzerland, the builder and manager of the road, and given in the *Centralblatt der Bauverwaltung*.

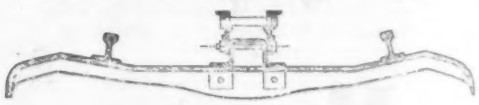


Fig. 1.

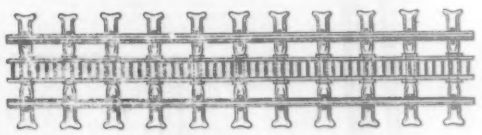


Fig. 2.

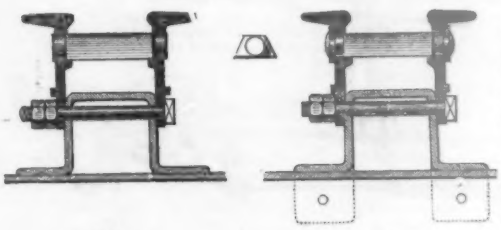


Fig. 3.

Fig. 4.

The road runs from St. Gallen to Gais, 8.72 miles, of which a little over 2 miles, divided up into five sections, has rack rails. The gauge of the road is 1 metre, the minimum radius of curvature is 30 metres (about 98½ ft.), and the maximum grade is 92 per cent.

* Chemin de fer Routier à voie d' un mètre. à adhérence et à crémaillière par M. Felix Martin, Ingenieur en Chef des Ponts et Chaussées, et M. L. Clarard, Ingenieur des Ponts et Chaussées.—Paris 1891.

The rack rail used is of the Riggenbach ladder type, as improved by Klose and Bissinger and employed on the Höllenthal road in Germany, the modification consisting in not necessarily riveting the trapezoidal rack teeth throughout to the channel iron side bars, but in supporting them on projecting ribs on the inner sides of these bars, thus preventing the teeth from turning. The cylindrical end bearings of the teeth are carefully fitted into the side bars in the usual way, but, as stated, are not riveted, so that they can be easily replaced by others when necessary. In the regular form of Riggenbach rack rail, as used on the Rigi road, for example, renewal of the riveted teeth has always been found somewhat troublesome. The modified form of rail will be better understood from the illustrations which we give.

By far the greater length of the road—about 12½ kilometres—was put down on the highway leading from St. Gallen to Appenzell, and only near the two terminals was the roadbed specially built for it. While the capital of the company amounted to only 1,740,000 francs, the cost of the road, in round numbers, was 2,000,000 francs, or about $400,000. Actual work of construction was commenced in September, 1887, and was completed in the fall of 1889.

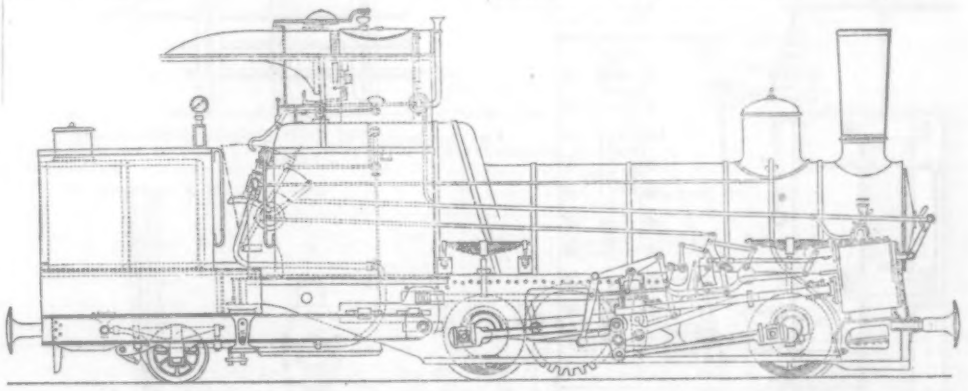


Fig. 7—Rack Locomotive for Street Service.

The starting point of the road, at St. Gallen, is at a height above sea level of 2,204 ft. The grades range from a minimum of 15 per cent., to a maximum, as already stated, of 92 per cent., the average grade being about 25.66 per cent. In general, the rack is put down wherever the grade amounts to 40 per cent. and over, but there are four short sections, not over 361 ft. long, on which no rack is in use even though the grade reaches 48 per cent. The longest rack section on the whole line measures 3,969 ft. The curves in the line amount altogether to over nine full circles. There are 124 culverts and seven bridges, one of them having a span of 121 ft.

A section and plan of the track are shown in figs. 1 and 2. Iron crossties, about 6 ft. long, are employed, the rails being secured by bolts and clips. The general design of the ties is apparent from the cuts. Near the ends they are 9.2 in. wide, but the middle portion is narrowed down to 4.8 in. Eleven of these crossties are used for every 29½ ft. length of track. The fish plates are 24 in. long Those used on the inner sides of the rails are ordinary flat plates, but those used on the outer sides extend down between the ties to prevent creeping of the rails. The ties at the rail joints are somewhat widely spaced, because of this arrangement. The whole track weighs about 213 lbs. per yard; including the rack rail, the weight reaches 348 lbs. per yard.

The rack rail is made in lengths of 14.76 ft., with 45 teeth, and is secured to the cross ties by peculiarly formed chairs, shown in figs. 3, 4, 5 and 6. The side bars of the rack rail, it will be noticed, have no flanges below so that they do not rest directly on the chairs, but are held up only by the bolts shown. This, at first, would strike one as a weak feature, but this is dispelled when it is considered that the strain on the rack is nearly all in the direction of its length. The ribs projecting inward from the flanges at the upper sides of the side bars are designed to take the wear resulting from the unavoidable contact of the locomotive driving pinions with the side bars without weakening them. The small outside ribs near the lower sides of the bars, on the other hand, serve as abutments for the tie plates at the joints (see fig. 5). A cross section of one of the rack teeth, showing one of the cylindrical gudgeons at the ends, is given at the upper right-hand corner of fig. 3. The pitch of the rack is 4 in. In every rack rail of 45 teeth, measuring, as already stated, 14.76 ft. in length, only five teeth are riveted at the ends, this expedient being adopted simply to hold together the side bars. The rivets, as shown in fig. 4, are headed down on washers, so that, if necessary, the rivet heads may be cut off to loosen the side bars, and new rivet heads formed of the bodies of the rivets projecting when the washers are removed. Fig. 5 shows the teeth with rivet projections not headed down, as used at the rail joints. Fig. 6 shows a cross section of the rack rail at road crossings where it was necessary to cut down the height of the side bars so as to bring their upper edges in line with the tops of the teeth. The racks were furnished by the Oerlikon Machine Works.

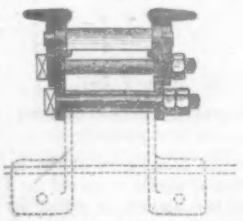


Fig. 5.

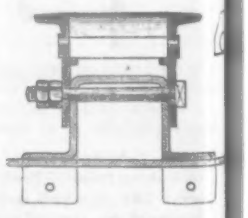


Fig. 6.

Special means to prevent creeping of the track were not considered necessary on this road, as both loads and average grades are lighter than on most of the other Swiss roads of the same general class. Up to the present time no creeping has been noticed.

Where the rack sections of the road begin, the teeth are round, capable of turning on their axes, and can move also in a vertical plane, the up and down motion being controlled by spiral springs. Passing from the ordinary track to the rack-rail portions is said to be unattended by any noticeable shock. One of the stopping places along the line is located on one of the rack rail sections where the grade amounts to 32 per cent., and no difficulty is said to have been there experienced in either stopping or starting the trains.

In the sharp curves there is a gradual increase of 3.36 in. in the gauge of the track. The wheel treads, with flanges included, accordingly have a width of 7 in. The changes of track gauge are accomplished by the spacing of track bolt holes in the metal cross ties. The greatest elevation of outer rail, with a radius of curvature of 98.4 ft. and calculated for a speed of 15½ mile per hour, is 7.47 in. For the lower speeds of 12.4 and 9.3 miles an hour, not to be exceeded where the line passes through villages, and on the rack rail sections, the elevations are 4.76 in. and 2.68 in. respectively.

At road crossings, the rack rails, notwithstanding that they have been somewhat cut down, still project 2.6 in. above the road levels, but this has not been found to cause any difficulty to the crossing of vehicles.

Fig. 7 shows one of the Klose locomotives, of which four are used on the road, three having been put in service in 1889, and the fourth, a more powerful one, having been secured in 1890. The engines were built at Winterthur, the three earlier ones having cost about $10,600, and the later one about $13,400. Between the two main driving axles, placed 9.84 ft. apart, is another driving axle, carrying the pinion which gears with the rack. This pinion axle is driven, through reducing gearing, from a pair of inside cylinders. In addition to the two main axles there is another rear axle at a distance of three meters, carrying, besides its pair of wheels, a brake pinion. The total wheel base of the engine, therefore, measures 19.7 ft. The main driving axles are loaded with from 18 to 22 tons (in the later engine these weights are increased to from 19 to 23 tons) when ready for service. The main drivers are 32 in. in diameter, and the crank pins are spherical in shape so as to afford the necessary flexibility when rounding the many sharp curves. All four cylinders have the same diameter and length of stroke, and are independent of one another so far as steam supply is concerned. In general, however, the design contemplates exhausting the steam from the outer cylinders into the inner ones when the engine is on the rack sections of the road. When running along the ordinary track the inner cylinders are to have no steam supply and are not to perform any work.

The boiler measures 13.12 feet from the firebox to the smokebox, has a diameter of 3.35 feet, and carries a pressure of 12 atmospheres. There are 151 tubes in the boiler, giving 1,011 square feet of heating surface. The grate surface amounts to about 15 square feet. The tender holds about 1,000 gallons of water and about a ton of coal. The total weight of the smaller engines when ready for the road, is 32½ tons and that of the larger engines 34.6 tons. The engines were designed to haul a 40-ton train at the rate of 30 kilometers an hour on the comparatively level sections; at 16 kilometers an hour on the heaviest grades without the rack; and at from 12 to 7 kilometers an hour on the rack sections. Their capacity, however, has been found to exceed this. The weight of the slowest trains is placed at 92 tons.

As regards brakes, there are, to begin with, ordinary block brakes on the locomotive drivers, strap brakes on the rear locomotive truck axles, and finally Klose air brakes for the several cars of each train. Provision is also made to heat the trains by steam in cold weather.

The passenger cars have central, longitudinal aisles, and each of the 13 cars has seating accommodations for from 23 to 40 passengers. The weight of each car is about seven tons. There are 16 freight cars with capacities for 10 tons each and each weighs about 6 tons.

The Manchester Ship Canal.

The report of the directors of the Manchester Ship Canal Co., for the half-year ended June 30, 1892, states that the available borrowing powers of the company have been reduced by £65,420. The available borrowing powers on June 30 were as follows: First mortgage debentures, balance unissued, £287,400; second mortgage debentures, balance unissued, £369,600; new debentures (Manchester Corporation), balance unissued, £559,500; total, £1,216,500. The balance of the new debentures will be paid to the company by the Manchester Corporation in the course of a few days. The directors expect soon to be able to issue the remainder of the first and second debentures.

Accompanying the report is a statement of estimated expenditure, prepared by order of the Executive Committee, as from June 1, 1892, to open the Ship Canal for traffic to Manchester, compared with the resources of the company. The directors regret to have to report that the new estimate shows that it *will be necessary to take steps at once to obtain further parliamentary powers to raise at least* £1,500,000, *in addition to the capital already authorized.* As there seems to be no prospect of obtaining this additional capital in the open market, the directors intend to apply to the Corporation of Manchester for the further financial assistance necessary to complete the undertaking upon such terms as may be arranged. In the statement of the resources of the company, assets valued at about £1,500,000 have been excluded from the calculation, because those assets will not be available before the opening of the canal for traffic to Manchester.

Tha statement which accompanies the report contains a complete analysis and explanation of the increase of £1,391,284 over the estimate of Sept. 1, 1891, of which the following is a summary:—Works and equipment (including £85,000 added for possible further work), £556,285; plant, £111,449—£667,734; interest and general charges caused by the prospective opening being postponed from March 1, to Dec. 31, 1893 (interest, £242,800; charges, £28,640), £271,540; land and charges connected therewith, £117,296; depreciation in value of shares taken over from contractor, £40,406; expenses of issue of Manchester Corporation stock, £32,200; stamp duty, rents, etc., £26,355; parliamentary and law charges, £10,693; added for general contingencies, £225,000—total, £1,391,284.

The total area of land purchased to date is about 4,508 acres, the purchase money for which, including compensation for interference, amounts to £1,115,092, in settlement of claims amounting to £2,159,004. Of the total area purchased, about 2,500 acres are spoil and surplus lands, and will be available for resale. Some plots have already been sold for the erection of works, and other sales are in negotiation. Detailed information is given as to the progress of the works.

As regards traffic, the directors observe that it will be remembered that the act of 1885 made it compulsory to open the lower portion of the Ship Canal from Eastham to the river Weaver, for the accommodation of the Weaver traffic, before beginning the works around Weston Point. Although the parliamentary traffic estimates of the promotors did not include any revenue from this portion of the ship canal, the traffic obtainable there has necessitated the provision of wharves and jetties, which are being constructed at a place that the directors have named Saltport, near to the junction of the ship canal with the river Weaver, the Weston Canal and the company's Runcorn & Weston Canal. Some traffic is already coming there, although the wharfage accommodation is not yet completed.

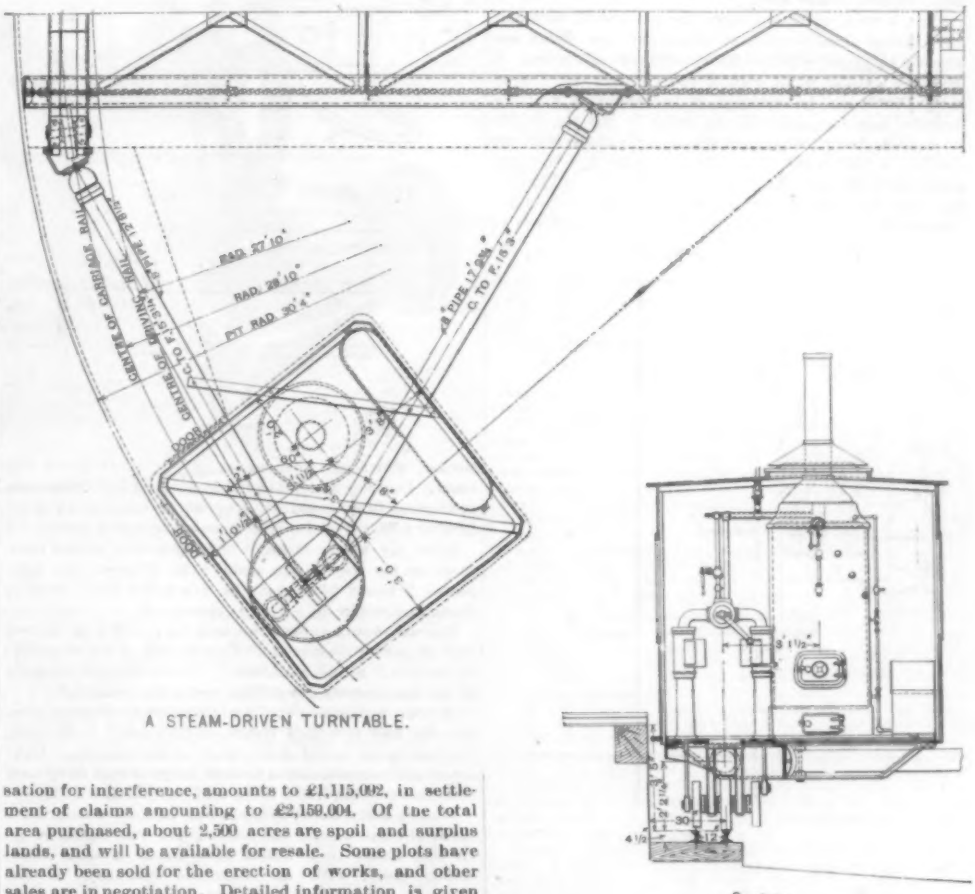
As an indication of the volume of tonnage which the Ship Canal is capable of accommodating, it may be stated that during the six months ended June 30 last 10,254 vessels carried 1,057,962 tons on the opened portion. This quantity included upward of 600,000 tons of dredged material, and the greater portion of the remainder consisted of salt and other traffic passing to and from the Weaver and the Shropshire Union Navigations, the bulk of which, however, under the clause of the Act of 1885, is exempt from toll.

With a view to accelerate and facilitate the construction of the Ship Canal contiguous to the Runcorn Docks it has been arranged to entirely close for a period, estimated at a little over 12 months, the river entrance to Runcorn Docks. The traffic is being dealt with satisfactorily under the new and somewhat complicated circumstances, principaly in the docks belonging to the Weaver trustees, who have leased them to the company on fair terms, which were met by the North Staffordshire Chamber of Commerce, the Earthenware Manufacturers' Association, and the Ironmasters' Association, of Staffordshire, and the North Staffordshire Railway Company.

The directors regret that one of their colleagues, Councillor Henry Boddington, has, owing to ill health, found it necessary to resign his seat at the board, and the Right Worshipful the Mayor (Alderman Leech) has been appointed to represent Manchester. The half-yearly meeting of the company was held Aug. 30. Lord Egerton, of Tatton, presiding, moved the adoption of the report, and said that he had never less despaired of the future of the Ship Canal than at the present time.

A Steam Driven Turn-Table.

The illustrations show in plan and section an arrangement for driving a turn-table by steam. The device here shown is in use on the Pennsylvania Road at Camden, N. J., on a 60-ft. turn-table. Recently another one has been applied to a 70-ft. turn-table at Powelton avenue, West Philadelphia. The arrangement is so simple that no description is necessary. The engine shown here was applied to a turn-table already built, to be turned by other power. A distance of 30 in. from the edge of the pit to the centre line of the driving rail was required for the motor. If the carriage on the turn-table was shifted to coincide with the driving rail, one rail would answer for both purposes. The motor and its house are supported on the driving wheel, and kept in position by the supplementary 8-in. strut going back to the girder as shown.



A STEAM-DRIVEN TURNTABLE.

Section.

The New Cunarders.

The Cunard liner "Campania" was launched on the Clyde the 8th inst. The following account of this vessel and her sister ship is from *The Engineer* of August 26th

The two great ships being built for the Cunard Company at Govan by the Fairfield Company have made such progress that the "Campania" will be launched in September. These ships will be but little smaller than the "Great Eastern." The estimated launching weight of each without engines or boilers is 9,600 tons. The work of launching will be attended with some difficulty owing to the narrowness of the Clyde. They will be sent into the water obliquely, with their sterns down stream. They will when afloat, be hauled stern first up stream to a large basin in which there is just room to turn them round and they will then be towed down stream and brought alongside a jetty now being specially lengthened to accommodate them at right angles to the launching ways, and will be placed under the great sheers to receive their machinery. The engines are ready for the Campania, and far advanced for the sister ship, which will probably be launched about Christmas. Each ship will be propelled by phosphor-bronze screws. The propeller shafts are carried outboard in casings worked in the skin of the ship, as in the "Teutonic," so that the whole shaft up to the stern bushes can be always under observation, and thus an unseen defect such as that which occurred in the case of the "City of Paris" will be avoided. The screws will not overlap, and a large opening is made in the dead wood between them to facilitate the motion of the water. The rudder will be wholly submerged, and is of peculiar construction. It is made of a single steel plate, weighing in the rough about 10 tons, and made by Krupp, as no firm in Great Britain possessed machinery competent to roll a plate of the great width necessary. The propelling machinery of each ship consists of two pairs of triple expansion engines, each of which will indicate 12,000 to 15,000 H. P. Each engine has five cylinders and three cranks. The crank furthest forward and that furthest aft will be driven by two tandem

cylinders; the central crank by a single cylinder. There will thus be two high-pressure cylinders exhausting into the single intermediate cylinder, which in turn exhausts into the two low-pressure cylinders, the pistons of which are on the same rods as the piston of the high-pressure cylinders. All the reciprocating parts have been made as light as possible to provide for the high speed at which the engines will run—over 100 revolutions per minute. Steam will be supplied in each ship by twelve double-ended boilers with eight furnaces in each. Each pair of furnaces has an independent uptake. The boilers will stand fore and aft, and there will be six stokeholds and two funnels, the largest in diameter ever constructed. The lines of the ships are exceedingly beautiful, and give promise that an enormous speed will be maintained. There will be two shelter decks, one over the other, and the flying bridge will stand 60 ft. above the water level. They will be in all respects the most magnificent ships ever constructed, and the rapidity with which they have been built is simply astounding

The McKeen Coupler Substitute for the Miller Hook.

The Thurmond Car Coupling Co. is now making a special form of the McKeen vertical plane coupler for replacing the Miller hook without altering the platform or draft rigging in any way.

Figs. 1 to 8, inclusive, show the method of applying the vertical plane coupler to passenger cars which are already equipped with the Miller platform and hook. A McKeen coupler head with a short shank, fig. 1, is so made that it can be inserted in the shank of a Miller drawbar (see figs. 2 and 3). In order to use the Miller uncoupling lever for opening the knuckle of the McKeen coupler, a bell crank lever, shown in fig. 6, which engages with the lock, fig. 4, is carried by a pair of lugs, *A*, fig. 1, on the head of the coupler. The connection between the uncoupling lever and the uncoupling device is

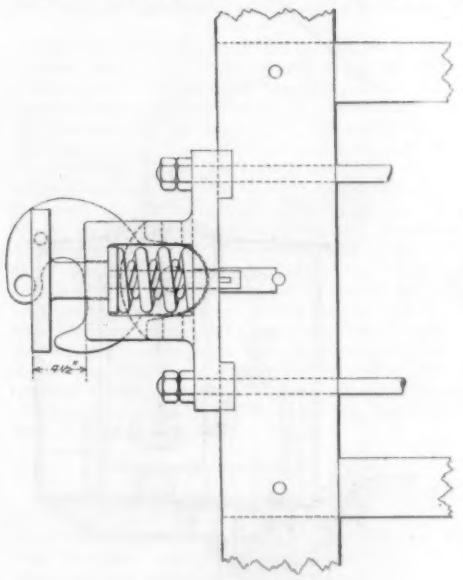


Fig. 9.

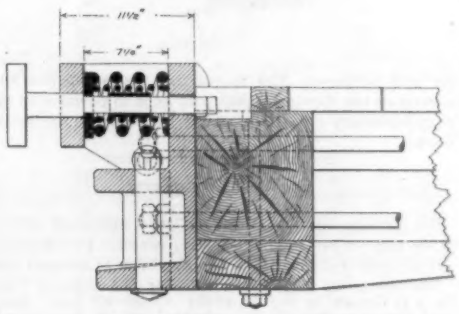


Fig. 10—McKeen Tender Hook.

shown in fig. 8. In using this lever with the Miller shank, the carrier iron shown in fig. 7 is used. The details of this carrier iron are plainly shown, and need no further description. This is a very simple device for changing from the Miller hook to the M. C. B. type of coupler.

The Thurmond Co. also supplies a neat design of tender hook of the vertical plane type. The details of this hook and its application to the tender of a passenger locomotive are clearly shown by figs. 9 and 10. For freight service the buffing plate and springs shown are not used.

Victor Hugo on the Locomotive.

A volume of heretofore unpublished writings of Victor Hugo has lately been issued in Paris, in which are many interesting familiar letters and descriptions. We translate for our readers his account of the first locomotive.

A considerable effort is required in order not to conceive of the iron horse as a veritable beast. We hear him breathe in repose, shriek at starting, bark in motion; he sweats, he trembles, he whistles, he neighs, he slackens the pace, he runs away; enormous clusters of sparks spring from his wheels, or, if you please, his feet, and his breath drifts overhead in beautiful clouds of white smoke, which are torn apart by the trees along the route. One can understand that nothing less than this prodigious beast could so drag at 12 leagues an hour 1,000 or 1,500 travelers, all the population of a town.

After my return at night our locomotive passed near to me on the way to his stable; the illusion was complete. I heard him groan in the midst of his cloud of flame and smoke like a horse oppressed.

But one should not see the iron horse. When we see him all poetry disappears. To hear him it is a monster; to see him it is only a machine. This is the sad infirmity of our times—only dry utility, never the beautiful.

If four hundred years ago those who invented gunpowder had invented steam, as they could have done, the iron horse would have been quite otherwise fashioned and caparisoned—the iron horse would have been something living like a horse and terrible as a statue.

What a magnificent chimera our fathers would have made of what we call the boiler! Do you conceive it? Of this boiler they would have made a scaly monstrous belly, with an enormous carapace, of the chimney a smoking horn or a long neck bearing a throat filled with blazing coals; and they would have hidden the wheels beneath great drooping wings: the carriages would also have taken a hundred fantastic forms, and in the night we would have seen passing near to the towns, at one time a colossal gargoyl with outspread wings, at another a dragon vomiting fire, at another an elephant with his trunk in the air, panting and roaring; all frightened, blazing, smoking, formidable, training after them, as it were their prey, a hundred other chained monsters, traversing the plains with the speed, the noise and the appearance of lightning. It would have been grand!

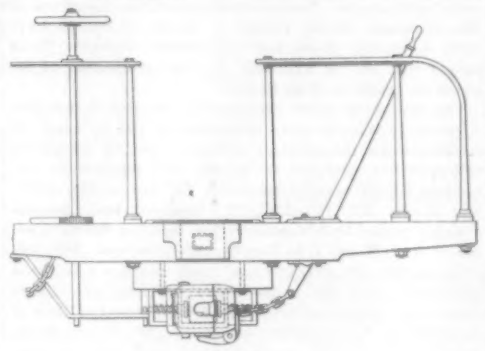
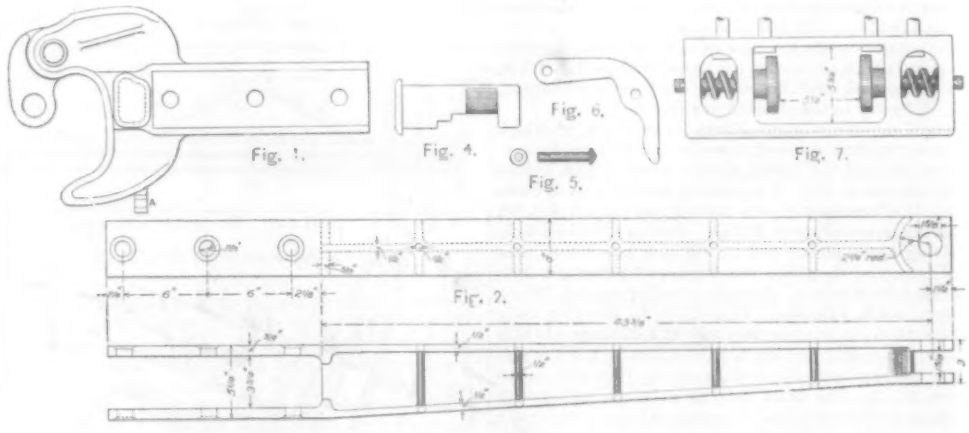


Fig. 8.

Guillimet's Brake Slack Adjuster.

The brake slack adjuster shown in figs. 1 and 2 is applied to two different parts of the brake rigging. Fig. 1 shows the device used in place of the ordinary dead lever bracket for outside hung brake beams. A rod *A*, fig. 1, is connected to the dead lever *D L*, as shown. The other end of the rod is supported by the bracket *B*, which is bolted to the truck bolster. The rod *A* has on its upper edge a series of teeth over which fits pawl *D*, of inverted U shape, which is attached to the end of the bracket *B*. This bracket also carries a guide yoke for the loose end of the rod *A*, as shown. To prevent the rod *A* becoming disengaged from the bracket *B*, if the pawl *D* were broken, it is provided with a stop which prevents it passing entirely through the guide yoke. Upon the rod *A* is a sliding sleeve *C*, provided with a tooth *E*, shown in detail in fig. 2. A spring *E*,

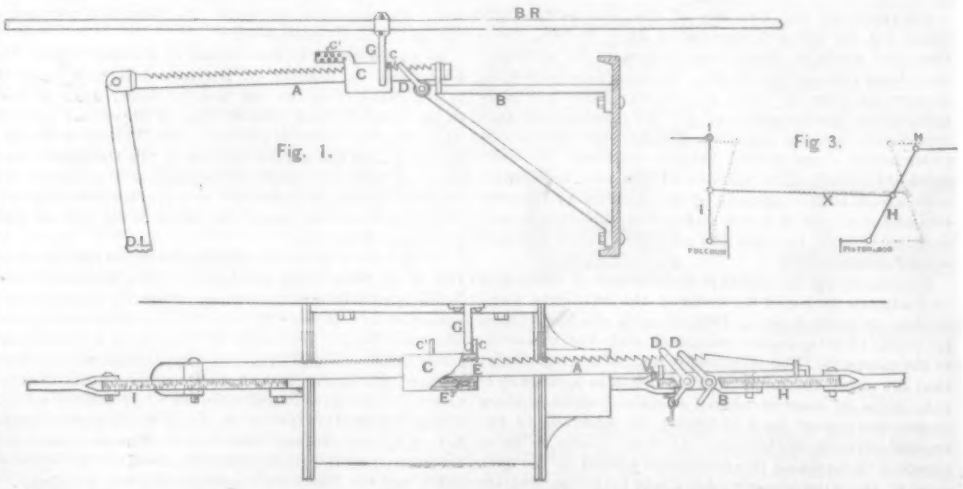


McKeen Coupler Substitute for the Miller Hook.

fig. 2, inside of the sleeve, causes the tooth *E* to engage with the teeth on rod *A*. The extension of the sleeve *C*, fig. 1, is pierced with a number of holes, C^1, to receive a pin. The distance between this pin and the pin *c* at the other end of the sleeve is made equal to the piston travel allowed in any particular case.

The action of the adjuster is as follows: When applying the brakes the brake rod *B R* moves to the left, and in case it moves too far the finger *G* attached to it engages the pin C^1, causes the sleeve *C* to move forward one or more notches. On releasing the brakes, the motion of the brake rod to the right causing the finger *G* to engage with the pin *c*. It will be seen that as the brake rod moves to the right upon the release of the brakes that the pin *G* will carry with it the sleeve *C* and the rod *A* a sufficient distance to allow the pawl *D* to gain the one or more notches of the sleeve *C* and take up the forward motion of the brake rod.

Fig. 2 shows the device when used in place of the rod *X* shown in fig. 3. In this case two pawls *D* and D^1 are used to engage the teeth of the rod *A*. Their position is such that one of them is always engaged in a notch while the other is one half a notch in advance. It will be seen by reference to fig. 2 that the rod *A* has two sets of teeth upon its upper edge. A pawl inside of the sleeve *C* engages in the teeth of this second set, which have but one-half the pitch of those into which the pawls *D* and D^1 engage. For each notch gained by the sleeve *C* the other pawls (*D* or D^1) gain one-half notch. This is necessary owing to the small amount of travel of the rod *X* (fig. 3), which has about one fourth of the motion that the piston has. If the teeth were larger the adjustment would not be fine enough. In this case, the finger *G* actuating the sleeve *C* is attached to the car body and



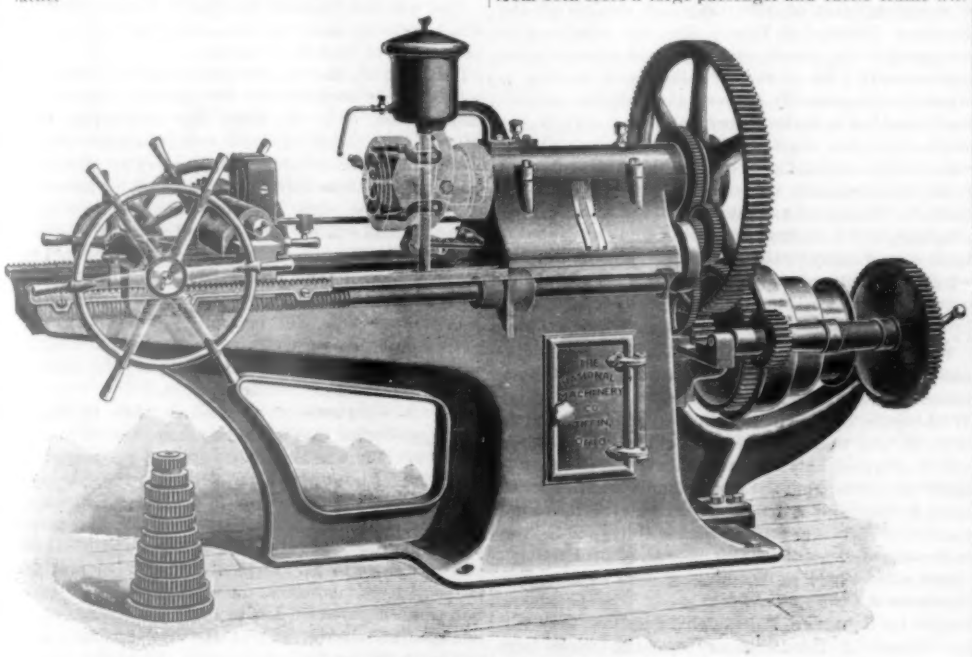
Guillemet's Brake Slack Adjuster.

the sleeve *C* moves with the rod *A*. The action in taking up the slack is the same as that previously described for fig. 1. By pushing the dead lever fig. 1 to the right slack can be taken up by hand at any time if it is found necessary. The length of the rod *X*, fig. 3, can also be shortened by hand to take up the slack by pushing the floating lever *H*, fig. 2, toward the right as the pawls *D* and D^1 hold the rod *A* at any point.

This slack adjuster is patented by Mr. L. Guillinet, of San Francisco, and is adaptable to all systems of brake levers.

National Bolt Cutter with Lead Screw.

We show an illustration of a "National" bolt cutter fitted with a lead screw for feeding the carriage at the proper rate for the bolt to cut, change gears being provided for the screw, the same as for the lead screw of a lathe.



National Bolt Cutter with Lead Screw.

Where square or bastard threads are cut on a bolt cutter, it is found very difficult, if not impossible, to get satisfactory results without a lead screw, owing to the drag of the die, and the tendency is to increase the pitch of screws cut on bolt cutters, which enables one to cut screws upon them, formerly considered fit only for the lathe. A lead screw makes this practicable, and some remarkable jobs of thread cutting are now done in this way.

The machine is provided with the latest improvements in the way of automatic and hand opening dies, pumps, &c., and with the National case die. It is made by the National Machinery Co., Tiffin, O.

The Moran Flexible Water Joints for Locomotives.

The Moran Flexible Steam Joint Company is manufacturing some very large flexible joints designed to be used for feed water connection between a locomotive and tender. Fig. 1 shows a section through a 2½-in. right angle joint for feed water service. It will be seen from the construction of this joint that it is to be used for a strainer for the feed water, and it is also provided with a frost plug to drain the pipes in cold weather. Fig. 2 is the ordinary ball joint for 2½-in. pipe. Fig. 4 is a general view of the Moran flexible joint used for all water, steam and air connections between locomotive and tender, replacing the ordinary hose connections.

This company makes flexible right angle joints for use for steam or air for 1-in. and ¾-in. pipe sizes. This joint was generally described in the *Railroad Gazette* of July 31, 1891.

The Transandine Railroad.

In view of the many contradictory reports that have been circulated with regard to the completion of the railroad across the Andes, connecting Buenos Ayres and Valparaiso, a representative of Dalziel's agency has ascertained from official sources the following facts:

The Transandine Railroad is divided into two sections—the Argentine, 108 miles in length, and the Chilian, 40 miles. The respective termini are Mendoza, on the Argentine side, at an elevation of 2,376 ft. above the sea, 650 miles from Buenos Ayres; and Santa Rosa, on the Chilian side, at an elevation of 2,739 ft., and 80 miles from Valparaiso. The total length of the Argentine and Chilian sections is 150 miles.

The concessions were obtained in 1874 by Messrs. Clark, of Valparaiso and Buenos Ayres, who, after completing the construction of the line from Buenos Ayres to Mendoza, succeeded in raising the necessary capital for the Argentine portion of the Transandine road; and in October, 1886, they promoted the company known as the "Buenos Ayres & Valparaiso Transandine Railway Co.," and undertook to construct the line for the amount fixed by the concession. The work was commenced from Mendoza in January, 1887, and on June 6, 1891, the line was completed for traffic up to Rio Blanco, a distance of 75 miles, and, notwithstanding the financial crisis that has so seriously affected all Argentine enterprise, the construction of the line is making progress, and by the end of this year it would probably be finished up to Punta de las Vacas, 88 miles from Mendoza, and only 20 miles from the frontier of Chili—a distance that can easily be traversed by carriages over a good road that has been constructed. In the course of next year the locomotive will reach Puente del Inca, 99 miles, leaving only nine miles of the Argentine section to be finished.

On the Chilian side work was commenced at Santa Rosa on the 5th of April, 1887, but on account of the financial crisis and the political troubles in Chili the work was suspended in December, 1890. The rails now extend for 20 miles, but a great deal of work has been done beyond that point, and the materials for the whole line are on the ground. Complete mechanical installations for drilling the summit tunnel have been erected at a great cost. More than 3,000 metres of tunneling have been drilled by hand labor, about 11,000 metres remaining to be drilled. This, with the drilling plant now ready, should be completed in three or four years. The work is progressing from 22 different headings at the same time. It is expected that when the rails have reached the foot of the pass, from both sides a large passenger and cattle traffic will be carried, which will attain considerable proportions when the line is completed, as the Andine Provinces of the Argentine Republic will be able to carry on their import and export traffic by this route at a very much reduced cost.

The journey from Buenos Ayres to Valparaiso by sea takes about 12 days and costs about £40, while by the railway it will take only two days, at a cost of less than £12, the total distance by rail being about 880 miles. The highest point of the line is 10,500 ft., at the frontier in the summit tunnel, being about 3,000 ft. lower than the Oroya line in Peru and the Antofagasta and Bolivia line.

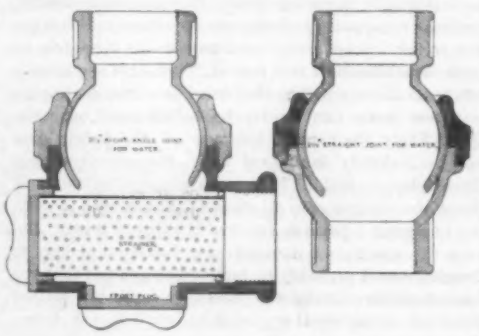


Fig. 1. Fig. 2.

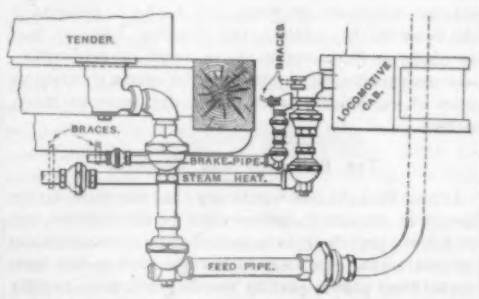


Fig. 3—Moran Flexible Water Joint for Locomotives.

To make the line perfectly secure from any possible interruption during the winter a series of tunnels has been adopted instead of artificial snowsheds. The railway has a narrow gauge, the space between the rails being one metre. For a short distance on either side of the frontier it was found impossible, without very great expense, to develop the line sufficiently to obtain gradients that could be economically worked by adhesions, so it was decided to adopt the "Abt" system of rack rails. The locomotives have been so constructed that they can work by adhesion on the flatter gradients and by the rack where the gradients are steep. The greatest inclination on the line is one in 12½.

The railway is now so far completed that the Royal Mail Steamship Company are booking passengers through to Valparaiso. The line is open on the Argentine side for 77 miles, to Rio Blanco. From there the company undertakes the transport of passengers and luggage during the summer months (November to May) across the Andes to the point of the Chilian Transandine Railway, where the rail route is resumed. The final accomplishment and completion of this great enterprise may be looked upon as certain, but it is impossible at present to name the time. It was originally intended to finish the line in five years' time, but on account of obstacles to construction in the shape of floods and revolutions and the bad state of Argentine financial affairs, this was found to be impossible. The final completion of the line will depend to a great extent on the financial state of the Argentine Republic. The capital is found by English financiers and the interest is guaranteed by the Argentine Government. It depends on the ability of the latter to carry out their guarantee, and, moreover, on the improvement of their credit whether the money will be forthcoming which is required to finish the line. The Argentine Government has just issued a decree authorizing the payment of the first guarantee account presented to them by the Buenos Ayres & Valparaiso Transandine Railway Co. up to Dec. 31, 1891.—*The Times (London).*

Cost of Transportation by Rail and by Water.

The demand for improvement of waterways at national expense is largely based on the idea that water transportation is cheaper than railroad transportation. It will surprise most readers to be told that this is by no means clearly the case. A few figures will show that the difference in favor of canals is apparent rather than real. Railroad freight differs from canal freight in the fact that the public demands quick transit. To compare a railroad with a canal, we must assume that the company is allowed time to wait for full train loads. Even if it waited 48 hours to make its train loads to suit itself, the goods would probably arrive at their destination much quicker than by canal. Now on any line where a good canal can run, a railroad can handle a net train load of 600 tons, at a direct expense for fuel, trainmen and train repairs of not over 40 cents a mile, and sometimes as low as 30. This means a cost to the road of one-fifteenth or one-twentieth of a cent a mile per ton, or less than that on an ordinary canal—not much larger, in fact, than the cost on good natural water routes.

Why, then, it may be asked, if railroad expenses are so low, are railroad charges so much higher? For several reasons. First, because the government pays the expense of constructing the canals and water improvements from the pockets of the taxpayers, while the railroad, being built by a private company, must pay maintenance and interest. It is obviously unfair to compare a part of the cost of canal transportation with the whole cost of railroad transportation. Take the cost by the Erie Canal and the New York Central Railroad. In a rate war like that with the West Shore in 1885, the railroad gains traffic at the expense of the canal. Quality of service being taken into account, the canal cannot compete on even terms with the railroad, when the railroad rates do not pay interest. On the other hand, experience with canal tolls has shown that, where the canal tries to pay interest, so far from being able to compete, it can get no traffic at all. In the case of a work like the Erie canal, which has existed for years and has paid for itself twice over, it may be fair to treat the artificial waterway like a natural one, and disregard interest and maintenance in comparing it with the railroad. But where it is a question of expending new capital on a large scale, it is unfair to compare a part of the cost of canal transportation—that of movement alone—with the whole cost of transportation—movement and maintenance.

Another reason for the apparent economy of canals is found in the arbitrary course which governments have pursued toward railroad rates. There has been, on the whole, a persistent effort to force railroads to adopt a mileage basis wherever it could be imposed and a somewhat arbitrary schedule of distance charges in all cases. The more arbitrary has been the system of charges the less use has the public had of its railroads, and the greater has been the apparent necessity for canals. In Germany, for instance, canals are a necessity, because the government insists on charging ten times as much for a thousand miles as for one hundred, although it is doubtful whether the expense of the one is quite double that of the other. If you insist on forcing up through railroad rates by short haul clauses you may have some need of canals; if you adopt equal mileage schedules you will have a great deal of need for canals. But it is because the legislation in either case has prohibited that adjustment of railroad rates which corresponds to the best interests of railroad economy or public economy.

There is one large class of exceptions, and only one, to the generalization that railroads are a more economical means of transportation than canals. Where a comparatively short artificial water route connects two natural ones, the saving of transshipment may be so great as to justify works of this kind. The Sault St. Marie Canal furnishes a marked instance of this kind, the Suez Canal, another. How far the Nicaragua Canal would fulfill the same conditions can only be a matter of conjecture. In all cases of this kind the shipper is enabled to get the benefit of the long natural water route. Where nature furnishes the water route there is no charge for interest, and in such cases it can be left out. But where government furnishes the water route there is a charge for interest; paid by somebody, even though it be not incorporated in the transportation rate itself. To treat an appropriation by Congress on the same basis as a free gift of God involves a fallacy in accounting and a dangerous precedent in practical legislation.—*Yale Review.*

The Channel Tunnel.

Mr. Gladstone is already pledged to support the Watkins Channel Tunnel scheme, and not unlikely the railroad king will take the pardonable opportunity of pushing the scheme a little during the Premier's short visit to Snowden; but I understand that Sir Edward Reed has every intention of bringing in a tubular railroad bill next session and pushing it to a second reading. Mr. Gladstone, after disappointing the member for Cardiff in the matter of the Admiralty Secretaryship, can scarcely refuse to support his bill while voting for that of his political opponent.—*New York Tribune's London Letter.*

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A contemporary, in an editorial intended to show the dense ignorance or cupidity, or both, of the gentlemen composing the management of the Chicago South Side Rapid Transit Railroad Co., has said that the Baldwin compound locomotives in use on that road are entirely unsuitable for the work, as the "cylinder condensation wastes more steam than the saving effected by increased expansion can balance. The cylinder area exposed to chilling influence is so large that serious annoyance has arisen from the volume of condensed water that has to be carried to the terminal points." Comment is unnecessary. The same judicious pen once wrote of a new locomotive: "She rides as smoothly as a parlor car and steams as freely."

The reports concerning the West Cambridge collision of Sept. 10, which we have summarized in another column, leave some important questions undecided, and the responsibility for the collision cannot be accurately determined without further light. The Massachusetts Railroad Commissioners, however, will probably make a clear report on the disaster without delay. The peculiarity of the case is that the junction is equipped with interlocked semaphore signals, and the line has automatic electric block signals, it being a portion of the first 10 miles of the Union track circuit signals ever put in use, these having been established there about 1881. The reports of witnesses say nothing about the fixed signals. The question of responsibility will therefore hinge on points of discipline. Discipline has, in fact, been a prominent question in all the recent railroad disasters of any magnitude, but in most cases there have been other considerations which have served to draw attention away from this particular feature. The present disaster, therefore, may have a fortunate result in bringing vividly before the public a case in which the conduct and training of the men shall be the single important issue.

The absolutely best crown radius for a rail head will probably not be developed for a long time. Perhaps there is no absolutely best radius for all railroads, but the best one for various individual roads will probably appear before long as the result of the attention which this element in rail design has received in the last few years, and of the gradual changes in section. Recently an 80-lb. rail, with 14-in. crown radius, has been put in the passenger tracks of the New York Central at West Albany. It is found that, while the old 80-lb. section with 12 in. radius has a narrow, bright streak on top, the 14-in. head has no such streak, but seems to get the whole bearing well across the head. This indicates that for the New York Central under actual conditions the 14-in. radius is the nearer right. We learn that when the Boston & Albany 95-lb. rail, which was shown in the *Railroad Gazette* of March 18 and Nov. 6, 1892, was first put down there was unusual wear from hollow tires. This rail head is 3 in. broad and has a crown radius of 14 in. As the driving tires were gradually turned up the excessive wear on the outside of the rail head ceased.

In the long and animated and very valuable discussion on the compound locomotive, which took place at the last convention of the Master Mechanics' Association, one very competent man said that he thought it was quite likely that the compound would be found to be more economical than the simple in maintenance and repairs. This remark appears to be omitted in the printed reports of the discussion. Apparently the speaker took water, and, like a discreet man, declined to go on record as having expressed such a notion; perhaps if he had a had little more courage he could have made a reputation as a scientific prophet. We find in a recent account of the compound engines of the Northern Railroad of France that the compound as compared to the simple engine in passenger service economized 2.3 lbs. of coal per mile, "and contrary to what is very generally believed, the machine has actually cost less to maintain per mile than any of the single expansion engines. Thus the expense with it was 15s. 0½d. against 15s. 4d. for the ordinary type from the averages of six years' service with each machine." We are not anxious, either, for the glories of prophesy, so we venture none, being well aware that it takes a good many swallows to make a summer; but we give this interesting item as a bracer for any of the compound men who may feel their faith weakening.

The Pittsburgh & Western, the Pittsburgh, Cincinnati, Chicago & St. Louis and other western roads have issued circulars announcing that ordinary freight for Washington, D. C., will be refused from Sept. 14 to Sept. 22, and that perishable freight and live stock will be accepted only subject to delay. This action is based on notices from the Pennsylvania and the Baltimore & Ohio, and is taken on account of the large number of passenger trains which will have to be run to the encampment of the Grand Army of the Republic, which will be held in Washington next week. The Baltimore & Ohio goes so far as to say that perishable freight for Baltimore, Philadelphia and New York will be refused. A Toledo paper reporting these facts states that the usual jealousy existing between the freight and passenger departments is considerably aggravated by this suspension of freight traffic, the freight department officers feeling that their rights are being over-ridden by the passenger men in too summary a way. Whether or not this feeling of jealousy is a permanent thing we cannot say, but it is not surprising that an event like this should give rise to it. The suspension of freight traffic whenever passenger traffic is unusually heavy is nothing new, of course; but the formal announcement of it beforehand, as in this case, is rather novel, though commendable. Railroad companies probably are not bound to transport any freight except with "such reasonable dispatch as their usual business will permit," but such mammoth affairs as the excursions that have been run during the last few years can hardly be called usual business. Quite likely the general interests of the public may not be seriously interfered with, the inconvenience from delays to freight being overbalanced by the benefits of the excursion to all classes. Every one is willing to stretch a point in favor of the Grand Army, and even the courts, in a damage case based on delays to freight, would probably be inclined to assume that the subordination of freight to passenger traffic is a settled principle of universal application: but it is easy to see that serious abuses may be perpetrated by an arbitrary suspension of freight traffic for over a week. If this country keeps on growing, and national gatherings like those of the soldiers, the Knights Templar, and the Christian Endeavorers are to swell in proportion, passenger traffic will apparently become a continuous series of excursions—with a few dull seasons interspersed.

The Railroads and Cholera.

At first thought one would say that the most active agency in spreading cholera must be the railroad, but we believe that the conclusions of careful investigators are that, on the continent of Europe, cholera has been carried from port to port by vessels much more rapidly than from the ports inland by rail. Nevertheless, the railroads will be the principal means of spreading cholera to the interior of our country if it once gets a foothold on the coast, and it behooves the railroad officers to be wise and vigilant and not get caught, as the health officers of the port of New York were, in spite of warnings.

Obviously, the most dangerous places on the railroad, those in which the germs will be carried from person to person with the greatest certainty, are the closets, both in the stations and in the cars. To disinfect the closets of the cars is exceedingly difficult, and those of the stations will require extreme care. As it is supposed that the germ is conveyed only in the dejecta of persons affected, it is apparent that the chief source of danger will be found in the emigrant waiting room closets, the station closets in general, and those of the trains, and to these the closest attention must be directed.

The next source of danger will doubtless be found in infected clothing, and it would seem to be necessary to scrutinize most carefully the baggage of emigrants or such other travelers as might properly be suspected, and to immediately burn or bury, without the slightest remorse or hesitation, any soiled clothing that may be found.

Care will also naturally be given to the sources from which drinking water is taken, and to the preparation and serving of food in all stations.

But, after all, the first precaution is at the ports, and here it will be necessary for the railroad companies to exercise not only vigilance but resolution, even against the officers of their own passenger departments, and to make sure that they carry no passengers among whom there may be any suspicion of infection. Doubtless these ideas will have occurred to a great many railroad officers already, and we trust that they have, before this, organized their plan of conduct for the protection of their own interests and those of the nation. If it is suspected that they are not thorough and resolute they will certainly suffer from local quarantines. As we write, news comes from Chicago of encouraging action on the part of the railroad officers and the state boards of health.

The following notes of precautions taken in Russia will suggest some that might be taken here. When the spread of cholera in Persia first made it probable that Russia might be attacked, the Minister of Transportation took energetic measures to prevent its introduction by the railroads or rivers. Each railroad management was required to send a physician and five sanitary policemen to St. Petersburg to receive practical instructions in methods of disinfection. At all junction points a physician was to make a sanitary inspection of all arriving passengers, and suspicious cases were to be held under observation. Through passenger service was to be suspended temporarily and passengers required to transfer at junction points, that infection might not be introduced by through cars. Car seat cushions were to be provided with special coverings, which must be washed when there was any suspicion that a cholera patient had been a passenger. Along the railroads at intervals of 100 versts (66 miles) a shelter was to be provided for passengers who might be attacked by cholera on their journey, and special hospital cars were to be run, containing two beds each and room for an attendant, for passengers falling sick on the road. Every road was to secure a two-months' supply of disinfectants, minute directions were given for disinfecting stations and for the sanitary conduct of the railroad employés.

The Minister of Transportation has a reputation for seeing that his orders are obeyed; and it may be thought discouraging that in spite of such precautions the cholera rapidly passed entirely across Russia, from the Caspian to St. Petersburg. But we have no evidence, except the rapidity of its spread, that it was introduced by the railroads, which, it should be remembered, are much less numerous in Russia than in other European countries and America.

Cost of Renewals of Cross Ties.

At the last meeting of the American Society of Civil Engineers, Mr. Benjamin Reece read a paper on the Increasing Cost of Tie Renewals. His argument was essentially that made by him before the New York Railroad Club last March, in a paper on Economies in Maintenance of Way, but the last paper gives more detailed figures, and figures of considerable interest as bearing on his position.

Mr. Reece shows that the cost of renewals of ties increases steadily and rapidly, as compared with rail renewals; indeed he presents figures to show that while the absolute cost of rail renewals decreases that of tie renewals increases. He gives a table showing these items for the principal railroads reporting to the Michigan Commission. In 1880 the cost of renewing ties on these roads was 42 per cent. of that of rail renewals. The percentage increased then until, between 1884 and 1885, it became more than 100 per cent. In 1885 it was 172 per cent, which was probably abnormal, as in 1886 and 1887 it was 130 per cent. In 1889 it was 197, and in 1890, 153 per cent.

For the principal railroads reporting to the Iowa Commission it seems that in 1884 the cost of tie renewals was 102 per cent. of that of rail renewals. The per-

centage increased then, with some fluctuations, until in 1891 it was 194 per cent.

From the figures which are presented for individual roads, we have compiled the following table, which shows the ratio of tie renewals to rail renewals for eleven different roads, for various periods, each period being of three or four years. The periods that we have taken are not in all cases precisely the same as given by Mr. Reece, but there is no error in the conclusions. The figures in the columns under the dates are tie-cost ÷ rail-cost × 100.

	1878-81.	1882-85.	1884-86.	1886-89.	1887-89.	1890-91.
Union Pacific....	37	115	..	195	..	296
C. P. system.	..	..	140	..	291	279
Santa Fe.....	..	..	67	..	174	255
Northern Pacific	144	158	..	730	..	308
St. Paul.....	..	..	80	..	141	200
Northwestern....	61	101	..	143	.	224
Lake Shore.....	80	172	..	158	..	111
Mich. Central....	42	133	..	148	..	125
Louisville & N....	..	47	..	102	..	216
R. & Danville....	40	32	..	117	..	242
Phila. & R.....	..	73	..	98	..	289

These railroads are widely scattered and they ought to give fair average conditions. The Lake Shore and the Michigan Central are the only roads in which there seems to be a sign of decrease in the relative cost of ties to rails. In the case of the Michigan Central Mr. Reece thinks that the lowering of this ratio is due to the attention that the Chief Engineer has given to the matter of removing ties. He thinks that there is a great deal of carelessness in this particular, and that foremen very often take out ties which still have in them considerable life. He does not explain the circumstances on the Lake Shore, but it is probable that unusual care has been taken to get the full service out of the ties of that road. Mr. Reece himself was for some time one of the maintenance of way engineers of the road, and gave much attention then to this element of cost of maintenance. He says that "The increasing cost of tie renewals is the result of several causes, the most important of which can be summarized as follows, viz., the gradual increase in price of timber, exhaustion of neighboring sources of supply, and increase of distance hauled; the marketing of this best timber so that the poorer qualities are cut for ties; the greater tendency to cut under rail flanges, because of increased wheel pressure and growing traffic; additional spike killing due to regauging and kindred causes. By no means the least cause of shortened life, however, is a lowering standard of inspection designed to minimize the price per tie. The author has often seen undersized ties accepted by inspectors on the ground that the young timber was tough, fibrous and better fitted to resist decay. After use in track for a couple of years the sap wood of such ties rots, and their size becomes so reduced that, unless vigilantly watched, the section men remove them without reference to their soundness; hence the purchase of such ties is generally attended with loss."

It will probably be said that Mr. Reece has ignored one element in the case, which is the decrease in the price of rails, together with the longer average life due to the rapidly increased proportion of steel rails used, and the inevitable increase in the price of ties. However, had his figures been corrected for these elements of cost, there would still have remained enough disproportion in the items of rail renewals and tie renewals to make his argument good; the moral remains the same. While the cost of maintenance of rails is twice as great as the cost of maintenance of ties, the engineer in charge would be justified in paying more attention to the inspection and care of rails than of ties. When the cost of maintenance of ties passed that of maintenance of rails, the ties should have received greater attention, but evidently they got less. General averages are dangerous, but obviously there is enough of truth in those which are given in Mr. Reece's paper (especially in the averages drawn from individual roads) to warrant the writing of his paper; the purpose of which, he says, is "to call attention to a condition not yet fully appreciated, and to stimulate investigation, to provoke discussion and induce an interchange of views."

The New South Wales Engines Again.

The full official account of the elaborate investigation by the Royal Commission appointed in New South Wales to inquire into the truth of the allegations made against some locomotives supplied by the Baldwin Locomotive Works has just reached us. A large number of witnesses were examined and some trials were made on grades of 132 ft. and 176 ft. per mile in order to ascertain if the engines would do the work expected. Diagrams and particulars of the weight of the train, speed attained, etc., are given, together with results obtained on other trains in New South Wales with heavier loads but at lower speeds, and some trials of similar engines on the Baltimore & Ohio. The New South Wales engines are somewhat smaller and lighter than the 10-wheeled passenger engines used on the Piedmont grade of the Baltimore, but the performances were practically identical with those obtained with the latter engines in the trials conducted by Mr. D. L. Barnes in May, 1891. The tractive force developed by the New South Wales engines on the 176-ft. grade, however, exceeded the maximum reached in the tests on the Baltimore & Ohio. A load of six eight-wheeled passenger cars weighing 323,000 lbs. was taken up a grade of 176 ft. per mile at a mean speed of about 15 miles per hour. This load is about equal to that usually hauled up a 53-ft. grade by an ordinary English express engine.

On examining the evidence, it is surprising to find how trivial and unfounded were the aspersions so widely thrown upon the material, workmanship and design of the engines, and it would certainly appear that the attacks must have been prompted by malice. Indeed, the member whose speeches in the legislature led to this investigation stated that he entered the House for the purpose of revenge, a curious admission, which his after conduct appears to have shown was only too true.

Our contemporary, the English *Engineer*, will find cold comfort in this evidence, for it is tolerably plain that the allegations and complaints against the engines were not only wholly prompted by personal motives, but were proved to be without foundation. The various discharged employés who alone attacked the engines were not only unable to prove their assertions, but the whole body of the railroad men, from trackmen and engine runners to the Chief Commissioner of Railways, bore witness that the great hauling power of the engines enabled heavier loads to be taken and double headers to be dispensed with, and in many cases the trains could be run faster with one of the new engines than with two of the old, while the easy riding (due to good equalization) promoted the comfort of the runners and neutralized any tendency of the greater weight to damage the track.

As might be expected, the only defects found in the engines were discovered altogether independently of the violent outcry made against them by a small political section.

The truck and tender axles (some of which failed in service and were replaced by the Baldwin Works) were complained of by the railroad authorities before the attacks commenced, while the tender tires, which were afterward found to be too hard and brittle and had also to be replaced, were never alluded to in attacks that alleged that 15 spokes were broken in a wrought iron driving wheel having but 14 spokes in all, and that "the train was delayed 20 minutes while repairs were being effected before the train could proceed"! Scores of other accusations equally absurd were raised against nearly every detail of the engines; the thickness of the smokebox tube plates, the use of brass slippers for the crossheads, the use of iron axles, all came in for their share of criticism, the attack being especially severe on the slight fins left in the hubs of the wrought iron driving wheels forged by Vauclain's process under hydraulic pressure.

The engines were, however, ably defended on all points, especially by Mr. Eddy, the Chief Commissioner of Railways, who made an elaborate general statement of his case, showing by numerous figures the economy effected by the use of these powerful, large engines, and by Mr. D. H. Neale, the Mechanical Engineer to the Railway Commissioners, who went very fully into the superiority of the engines over those formerly used and showed that they were perfectly fit to travel over the permanent way of the New South Wales railroads. Indeed, early in the hearing (which extended over several weeks) the attack on the engines was seen to be hopeless and was practically abandoned for an attack on the Colonial track, which was alleged to be unfit for loads of 32,500 lbs. per axle, owing to the wide spacing of the ties and the fact that iron rails were still in the road. Mr. D. H. Neale, however, argued that while the ties in America were closer together, the Australian timber was so far harder that the ties were not cut into by the rail, the fastenings remained intact and the Australian track was moreover better drained and ballasted, and that these features with the use of heavy rails (75 lbs. per yard) made the Australian fully equal to if not superior to the average American track. The "grey iron-bark" ties used weigh about 250 lbs. each, are exceedingly hard and strong and very durable. It is stated that some will be sent to the World's Fair after having seen 33 years' service and being still sound and hard.

As already stated, the Commission reported that the engines were not defective, were not unsuitable to the rack and would perform the service expected of them when the defective tires and axles were replaced.

Anthracite Coal Tolls.

The disagreement between the Pennsylvania and the Reading over the matter of tolls on anthracite coal is not a new affair at all. The position of the Pennsylvania is well known, for it has always refused to agree to any combination or to be a party to any contract either upon rates or tonnage. At the same time it has allied to itself new mines, and has invested many millions in coal companies operated independently, but without returning anything to the company save in the way of tonnage, and has tacitly agreed to the combination. Not having seen the new toll sheets we cannot make comparisons of the future rates and those which existed prior to the notice given by the Reading and promptly followed by the New Jersey Central, which is, of course, in quite as quick touch with the Reading as it was before the order of Chancellor McGill, but the practical effect of it is to make full local charges instead of pro-rating upon coal delivered by either of these roads to points on the Pennsylvania, at junctions with the Pennsylvania, for consumption upon the lines of the latter company.

In pursuance of the usual policy of the anthracite roads, when the price of coal was recently advanced there was an advance in tolls as well. The Pennsylvania refused to quote higher rates to local points than upon tidewater business and so, while leaving its local tariff untouched, retained its seaboard rate, upon the ground that the Reading having purchased coal from individual operators had not a right to make a profit out of transportation without allowing a share to the producer.

This is only recurring to the autocratic policy of the late President Gowen. The tolls for the shorter distance from the mines to Philadelphia have always been greater than for the longer distance to tidewater, never in many years less than $1.00 a ton, which was an average of considerably more than a cent a ton a mile and that for a down grade, though, of course, the cars returned empty. On one occasion the Lehigh Exchange refused to advance the retail price to Philadelphia in accordance with the action of the Schuylkill Exchange, both usually working in harmony. The Lehigh Valley then, as it does now, shipped large quantities of coal to that city over the North Pennsylvania, a leased line of the Reading, and to equalize matters the tolls over that road were increased by the Reading from $1.90 to $2.20 a ton, thus putting the Schuylkill and the Lehigh operators apparently upon the same footing in the market, with the difference that the railroad company would make the profit out of the Lehigh trade and the advance would go to the Schuylkill men shipping at the old rate over the Reading main line.

Mr. Gowen overlooked the Phillipsburg connection of the Lehigh Valley with the Belvidere Delaware division of the Pennsylvania. The Lehigh coal was promptly turned over to that line, and retailers in the northern part of the city made arrangements to supply their customers from the yards of other dealers in the southern part whose yards were reached by the Pennsylvania, and the result as long as the tariff held, which was less than a fortnight, was an average loss of a thousand tons a day to the North Pennsylvania, which got no Lehigh coal at all under the new tariff.

The situation is changed now, because the Reading holds the Lehigh Valley lease, and of course no Lehigh coal that can be handled by the Reading or by the Jersey Central will be turned over to the Pennsylvania, as long as it holds to its position of keeping rates as they are now. The Pennsylvania trade will, therefore, be diverted to other collieries, and consumers who have used Reading or Jersey Central coal will look to collieries tributary to the Pennsylvania for their supply. There will be no difficulty in getting enough in that way, so the result will be to increase the local trade from Pennsylvania collieries to points on the Pennsylvania road, and to increase the amount of Reading and Jersey Central coal seeking a competitive market.

A statement of passenger earnings of the principal French railroads before and since the reduced rates which went into effect April 1 (an account of which is given in the *Railroad Gazette* of Jan. 1 last) is published in *Le Journal des Transports*. The passenger earnings, including government tax for the first 11 weeks of this year, and for the first three months of the new rates, are compared with those for the corresponding periods of last year. In the earlier period, that is, while the rates were the same in both years, the passenger receipts per kilometre were from 0.77 per cent. to 3.35 per cent. greater than last year on four of the great systems, and from 1.50 to 3.51 less on the other three systems—that is, on the whole, about the same both years. For the three months of the new tariff these receipts were smaller this year on every one of the seven systems, ranging from 5 to 12 per cent. less. The result for the six great companies (the seventh system is the State system) for the entire half year, is that with 2¼ per cent. more mileage they received, government tax included, 2⅓ per cent. less for passengers and 8½ per cent. less for baggage and express, the decrease in the latter being greater in amount than in the former. A large part of the decrease is in the government tax, which is paid in buying tickets; and the indications are that the earnings will soon reach the old figures, but at present they disappoint those who looked for a great

and immediate increase of travel as a consequence of the new rates, which (including tax) are about 24 per cent. lower than the old rates for the third class, 18 per cent. for the second class, and 9 per cent. lower from the first for single tickets; the reduction on round trip tickets, which form a large part of the whole, being somewhat less.

The agitation concerning the smoke nuisance continues with vigor, although the hoped-for improvement in the condition of the atmosphere may not be apparent to the casual observer. At present the energies of the smoke officials seem to be directed chiefly towards tugs and locomotives. Several fines of $50 each have recently been assessed upon owners of tugs, and as a result there are renewed promises of the use of anthracite coal and improved smoke devices. A large proportion of the switching engines working within the city limits, and the road locomotives which come into the city, are provided with some form of smoke preventing device which has been approved by the smoke officials. The number of locomotives which a railroad company has equipped appears to be no indication, however, of the number of complaints. In fact it seems in some instances that the more complete the equipment the more frequent the reports. One company which has few, if any, of its locomotives fitted with approved devices has not recently been reported, while, on the other hand, the Illinois Central which has placed smoke preventers on every one of its locomotives which comes within the city limits was fined $25 each on 22 cases recently and more complaints are awaiting judicial action. Inasmuch as there are two separate counts against one locomotive *one minute apart*, as another was adjudged to be guilty of producing black smoke at about 9.30 p. m. on a dark night, and still another was declared to be a nuisance in the city, when in fact it was about 50 miles out on the road at the time specified, no complaint can properly be lodged against the inspectors for lack of zeal. Some railroad officers are beginning to feel that they are in the unhappy condition of being damned if they do and damned if they don't, fined if they will and fined if they won't.

The only strictly first class "Limited" trains between New York and the West are those of the New York Central. Only full rate first-class tickets are accepted on these trains, and full first-class service is rendered.—*New York Tribune*, Sept. 6.

The Pennsylvania Railroad is the only line that maintains a strictly first-class limited train between New York and Chicago. All other "Limited" express trains are merely imitations of the celebrated Pennsylvania Limited.—*New York Tribune*, Sept. 8.

These are specimen moves of the see-saw game which our ten-thousand-dollar passenger agents busy themselves with when the stream of callers slackens sufficiently to give them a little time to themselves. The poor editor who puts these in as reading matter, must be having trouble with his conscience by this time, but the literary artists who constructed the statements would doubtless be able to justify themselves as truth tellers, notwithstanding the apparently wicked lies they accuse each other of. The aggressor probably started out with the report that the Pennsylvania accepted some half-fare excursion tickets on its limited train on the payment of the extra fare. It was no ordinary, plebeian excursion, however; it was, we believe, on the occasion of the Chicago Presidential Convention. It was a serious relaxation of the regulations, however, and the Central is hardly to be blamed for grieving over the matter. But the reply of the Pennsylvania is also based on facts, so we may look for further reproofs of the reckless. The Pennsylvania can show not only the oldest limited and the oldest of everything else, but the newest as well. Ivory sofas, satin-covered bell cords and gold door-knobs cost too much money to let the advantages of such luxuries be neutralized by an enemy. Who could be expected to sit quiet under such calumny?

The railroads with termini in Paris reduced their suburban rates April 1, at the time of the reduction of the general passenger tariff, the amount of the reduction in all cases being not far from 10 per cent., except that two companies made no reduction in their third class commutations, and none for the shorter distances in the other classes. In all cases the rates vary pretty nearly in proportion to the distances, though the Western Railroad charges the same for 25 kilometres (15½ miles) as for 30 (18½ miles). An article in the *Journal des Transports* shows the prices of yearly commutation tickets for the distance of 35 kilometres (22 miles) on the different lines to be as follows:

	P., L. & M.	State.	Northern.	Western.	Orleans.	Eastern.
Class 1.....	$70.23	$70.81	$78.76	$89.82	$77.60	$93.10
Class 2.....	52.77	52.96	59.17	71.00	56.26	69.81
Class 3.....	35.11	38.80	39.58	54.13	46.95	46.56

For the distance of six miles the four companies with the highest rates charge about $47 for the first class, but three of them charge only half as much for the third class. Two others for that distance make a rate of $34 per year for first class, and one of them $18, and the other less than $15 for the third class.

The newspapers have printed numerous interviews with employés of the Philadelphia & Reading and the Central of New Jersey during the past week concerning the discharge of certain engineers on the latter road, and other alleged disturbances, which the newsgatherers have apparently been trying hard to make people believe were likely to bring on a strike. But an interview between President McLeod and Mr. Arthur and other leaders of the Brotherhoods on Tuesday settled all differences very quickly, and the reporters subsided. It seems that three engineers had been discharged from the Reading road for becoming members of a secret organization, that is, the Brotherhood of Locomotive Engineers. Two of these had signed agreements, on entering the service, not to take such action, and their reinstatement was not asked. The third had been employed without making such an agreement and was reinstated. Mr. McLeod took occasion to assert in a very positive manner that the Reading will not employ any new men in any department who belong to secret trade unions, and they must agree to stay out of them.

The experiment of the Chicago, Milwaukee & St. Paul in running its own sleeping and dining cars is now old enough to show some definite results. In the annual report of the St. Paul, just issued, appears a brief statement of the financial results of operation. The year covered by the report is the "first full year of operation by this company of its sleeping car lines. The gross earnings were $196,066.32, operating expenses $82,546.52, and net earnings $113,519.80. The investment of this company in its sleeping cars stands on its books at $678,965.13 for 52 cars. It will appear, therefore, that the net earnings are sufficient to pay for the new cars required each year to replace old cars, and pay a fair return on the investment. The result is specially gratifying, because it has not been obtained by impairing the service, which has been satisfactory to the public." From personal observation, and from such reports as we have received, we believe that the statement as to the quality of the service is quite correct.

One of the first interlocking towers erected in the United States is now being stripped and will soon be demolished. It is a brick tower, put up at East Newark, on the line of the Pennsylvania road. It was built to hold a Saxby & Farmer frame and was erected in 1875. All the material for the interlocking installation, including interlocking machine proper, lead out, ground connections, signals and lamps came from England and the tower itself was built of brick and strictly on English models. The whole plant was therefore an interesting and valuable example of English practice. A new tower with a larger machine has been erected to replace the one now abandoned. The Toucey & Buchanan tower at Spuyten Duyvil and another at the Grand Central were erected a few months before this one, and these were the first built in the United States.

NEW PUBLICATIONS.

Elements of Machine Design; Cuts and Plates, for the Use of Students in the Lehigh University. By J. F. Klein, Professor of Mechanical Engineering. Second and revised edition. Bethlehem, Pa.: the Moravian Publication Office, 1892. Price $6.00.

This is a volume of 212 large octavo pages, besides a number of inserted folding sheets and several large plates of tables for laying out gear teeth. Typographically the book is an excellent piece of work and it has a good alphabetical index of 18 pages. The text and plates constitute a short course in designing the most important of the machine parts that occur in practice. Such parts are shown on well drawn and well printed plates, which are very clearly lettered. The text accompanying each plate explains the symbols adopted, gives data and formulæ for dimensioning the parts and explains briefly their functions. It is an elegant and simple treatise, and so far as it goes a very complete one, and there are copious references to the works of Reuleaux, Unwin, Rankin and other writers, principally the two former, so that the student who is ambitious to go further or whose duties may lead him into more complidated and extensive studies, will know where to look for what he wants.

The topics treated are in general terms, fastenings, gearing, rotating pieces and bearings. There is a short chapter also on engine connecting rods. Under fastenings are screws, bolts and nuts, set screws, rivets and riveted joints, joints for connecting parallel plates and plates not in the same plane, and keys. Under gearing are methods of laying out gear teeth and wheel trains, of laying annular and eliptical wheels, dimensioning bevel wheels and worm wheels; belt gearing also receives attention. The large folding tables in the appendix give values for laying out profiles of gear teeth so arranged as to involve only the use of the square, ability to lay off distances accurately, and the multiplication table. There are tables for racks, involute profiles for gear teeth, epi-cycloidal profiles and hypo-cycloidal profiles. Altogether, the book is not only a valuable one, but very convenient for the use of the student and the practical engineer.

TRADE CATALOGUES.

Indicators, Planimeters and Other Engineers' Instruments.—The Thomson Hydraulic Co., manufacturers of water meters and engineers' instruments, Temple Court, New York City, has issued a small pamphlet announcing a new departure in its business. It has purchased the business, machinery, patents and good will heretofore conducted under the name of the Engineers' Instrument Co., of New York City. The principal product of that company was steam engine indicators, planimeters, pantagraphs and speed counters. The new proprietors will continue to make these instruments as an adjunct to their principal business, which is the manufacture of the Neptune water meter. Mr. A. B. Calkins, who designed the instruments heretofore made by the Engineers' Instrument Co. remains as Superintendent of the factory. The Calkins improved steam indicator is illustrated in the little pamphlet before us, and described at some length. A polar planimeter, a pantagraph and a speed counter are also shown.

Catalogue and Price Lists of the Brown & Sharpe Manufacturing Company, and of Darling, Brown & Sharpe. Providence, R. I., 1892.

The little blue catalogues of these companies must be very well known to our readers by this time. The edition of 1892 is the largest yet issued, the increase in pages indicating the increase in the number of articles regularly manufactured by the concerns. The pages this year are 248, being an increase of nine per cent. over last year and of 148 pages over 1879. The principal additions are: A plain milling machine, with vertical spindle milling attachment; 13 in. engine lathe; automatic screw machine and various machine attachments; standard caliper gauges for sizes larger than 3 in., etc. The catalogues are mailed to any address without charge.

Foreign Railroad Notes.

It is reported that the Russian government has determined to build a branch of the Trans-Caspian Railroad from Samarcand northward to Tashkend, a distance of about 125 miles, the work to be done directly by the government, with Lieut.-Gen. Annenkov, who was so efficient in building the older part of the road, as Superintendent of Construction. It is said that the extension is to be completed within three years.

We noticed some time ago the establishment in Germany of trains similar to our "limited" trains, the seats being numbered and secured beforehand, in cars on trucks, with entrances at the ends and a side passage (but with compartments), and a buffet from which something to eat and drink can be had. One was put on between Berlin and Frankfort on-Main, and another between Berlin and Cologne. These trains almost immediately became so popular that the Prussian railroad administration decided to supply the day express trains on the other lines, with similar cars as fast as they could be provided. It is expected that they will be done in time for the inter-train service. Among the new cars will be some with central passage like ours, instead of a side passage. They are for first and second class passengers.

The German Railroad Union has awarded the prizes offered in 1890 as follows: A prize of 7,500 marks ($1,800) to Mr. von Borries, of Hanover, for improvements in compound locomotives; a prize of 3,000 marks ($720) to George Westinghouse, Jr., for improvements in his atmospheric brake; a prize of 3,000 marks to Paul Langbein, of Saronno, for an apparatus for transferring standard-gauge cars to narrow-gauge railroads; a prize of 1,500 marks to Mr. Wedler, shop clerk in Magdeburg, for apparatus for protecting men working at lathes; a second of 1,500 marks to Mr. Volkmar, of Strasburg, for improvements in movable axles; a third to G. Häutzel, mechanical engineer in Strasburg, for a paper on the behavior of track ballast in statical relations; a fourth to Professor Launhardt, of Hanover, for his treatise on "The Theory of Location;" a fifth to Railroad Inspector Kolle, of Berlin, for a work on apparatus for protecting switches and signals; a sixth to Ludwig Kohlfürst, of Kaplitz, Bohemia, for a work entitled "The Development of Electrical Railroad Appliances."

Mr. Westinghouse had his prize divided between the German Society of Locomotive Engineers and the Provident Fund of the German Locomotive Engineers.

Notes on Railroad Location and Construction in Eastern Canada.

BY WM. B. MACKENZIE, *Assistant Engineer I. C. Railway, Moncton, N. B., Canada.*

Reconnaissance.—It has been said that the engineer who can conduct a reconnaissance properly is born, not made. He must have an eye for country, and depend mainly on his own natural tact and judgment, matured by experience.

Provided with the best available map of the country—the geological maps are the best so far published—one or more barometers, and a pocket-compass, the engineer notes the governing points and takes their height with the barometer. Two should be used, the readings being taken simultaneously at a series of intervals previously agreed upon. While serving as a general guide, only approximate heights can be obtained by the barometer. One instrument alone should never be depended upon.

Sometimes when following a stream it is scarcely possible to go far astray, but when the waters run about at right angles to the line, the difficulties are much increased. Then the lowest points on the ridges and the highest banks at stream-crossings must be sought. Several routes are examined, that promising the greatest ul-

timate economy being generally selected, although sometimes, for political and other equally reprehensible reasons, the best line is adorned with "curves of beauty," to the eventual discredit of the locating engineer, although he may be in no wise responsible for the mischief.

There is always one *best* line between any two points, and, generally speaking, not one quarter-enough money is spent in seeking it. The extra cost of the construction of the one *not* the best, like the sea-captain's mule-hire, "is there, but you can't see it." Some expert, standing on the platform of a pullman car, 50 years after, may see it, when the country will have been cleared of wood, and the eye takes in miles at a glance.

Preliminary.—Next comes the preliminary survey, where the transit and level are employed. If location is at all likely to follow, an ordinary compass should not be used. The transit should be provided with a gradienter and a level on the telescope. The gradienter is very useful when running to a maximum grade. The preliminary should be run with such care that it will not deviate from the final location more than 200 or 300 ft. at any point.

I will here give a description of the running of both preliminary and location simultaneously, by the writer. After the general reconnaissance had been made, and certain running points fixed, and when the preliminary party had been at work for one day, a location party was started. The engineer in charge provided himself with a wooden box 21×28 in. and 1¾ in. thick, holding about 20 sheets of common drawing-paper, a brass ruler, protractor, 12-in. scale, and a pair of 6 in. compasses. On the front edge of the box were fastened a pair of leather handles, and a pair of brass hinges on the other edge. When this box was opened out and set up on four pegs, under the grateful shade of some wide spreading tree by the boy who carried it, the engineer's office was located there for a time.

The engineer was almost constantly with the preliminary party, and gave directions to the location party from his own general notes and the results of the preliminary work. The sheets already referred to were 20 in. × 27 in. in size, numbered from 0 upward. Every evening the transit-man of the preliminary party plotted his notes on these sheets, to a scale of 200 ft. to an inch. As the sheets were finished they were handed to the topographer, who recorded on both sides the line, the rise or fall above or below each station, or at distances two or three stations apart as the case might be, according to the roughness of the ground. These notes generally extended 100 to 300 ft. on each side of the line. While this was being done, the leveler had plotted up his profile. The engineer, then, with the help of the plan and profile, and a fine silk thread, laid down roughly the best grades possible between the most abrupt points or profile, and dotted on the plan the line which would give the least cut or fill for this grade. Next the location was plotted on the plan, keeping as near to the dotted line as the limiting curves and grades would allow. Notes were then written on a slip of paper and sent back by the boy to the chief of the locating party. They would read somewhat as follows: "From Sta. 40 measure at right angles to the right 36 ft. and fix a point. Then go to Sta. 45, measure 50 ft. to the right at right angles, and set up the transit here. Sight back to first point, run tangent to Sta. 65 of location. Then put in a 5-deg. curve to right, to Sta. 75 + 50. Then run tangent to 80 + 40, and put in a 4-deg. curve to left," etc. By this means the engineer kept both parties hard at work, and, with the help of a saddle horse, the box and the boy, did the necessary exploratory work ahead of the preliminary party, as well as making an occasional visit to the locating party. . . .

Earth-Work.—Shallow embankments are made up by scrapers from the sides, and shallow cuts are plowed and scraped off from the top. Deeper cuttings are removed by trollies drawn by horses. Sometimes, in a heavy cutting, the track is laid over the top of the hill, and some distance to one side, if it can be done without exceeding a grade of 3 or 4 ft. per 100, and steam shovels are put to work at both ends, while the material is hauled away by locomotives and cars to make embankments at a distance. For this purpose temporary trestles are built over unfinished culverts and over depressions near which no material is obtainable for embankments. These trestles are finally left in place when banks are completed.

Ballasting.—Gravel ballast is generally brought by train. It is loaded on the cars by a steam shovel and unloaded by a plow, or by side-dump cars. The track is lifted twice, and the ballast packed under the ties with shovels, to a depth of 12 or 14 inches.

Approximate cost of grading the road-bed:

Kind of material.	Price per cubic yard.
Earth in cuttings	2c. to 28c.
Frozen earth	31c. additional.
Earth in foundations	30c.
Hard clay	35c.
Hardpan	55c. to 70c.
Rock (loose)	55c. to 70c.
Rock (solid)	$1.15 to $1.50
Excavation in water	80c. plus dry price.
Extra haul over 1,000 ft.	¾c. per cubic yd. over 1,000 ft.
Filling by train from borrow-pit 1,000 ft. from centre of bank	35c.
Filling by train from borrow-pit (three mile haul)	40c.
Ballast	30c.

Box Culverts.—Dry stone work for box culverts has had its day, and it is not probable that in future it will be used to any great extent in this country. Culverts are now laid in lime and cement mortar, designed to vent water under a head, as an iron pipe would; no dry stone culvert can do this, and the attempt generally results in a washout. The side walls of box culverts are extended out beyond the end, or head walls, equal to height of culvert, so that in freshets, the opening cannot be obstructed by drift-wood, for the water will rise, flow over and fall into the opening between the obstruction and the head or end wall of the culvert.

Fixing the sizes of culvert-openings is a matter requiring great care. If possible, the engineer in charge should personally examine the ground and the character of the country drained by the stream, whether rough, rolling or flat. If county or geological maps exist the drainage area can be gotten approximately. Then as a rough approximation we use Major E. T. D. Myers' formula:

$$A = C \sqrt{M}$$

A = Area of opening in square feet.

M = Drainage area in acres.

C = variable coefficient = 1 for flat ground and 1½ for hilly, compact ground.

Highway bridges and openings over the same stream are examined, and the highest freshet level obtained from "the oldest inhabitant." With this information, Myers' formula, and some brains, the openings will not be far wrong.

TECHNICAL.

Manufacturing and Business.

Westinghouse, Church, Kerr & Co., of New York, Boston and Chicago, have secured the exclusive agency for the United States for the sale of the Hodges & Haven-strite system of refrigeration and ice making, made and heretofore sold by the Standard Refrigerating Company of Boston. The new agents have already taken a large number of orders for apparatus for making artificial ice.

The Great Western Steel Casting Co. has been formed at Peoria, Ill., with capital stock of $100,000. John H. Francis, Frank S. Gogin and George J. Gibson are the incorporators.

The Lodge & Shipley Machine Tool Company, of Cincinnati, has been incorporated, with a capital of $100,000. It will succeed to the business of the Ohio Machine Tool Company. The new company will introduce several new designs of turret lathes and other machines.

The new foundry and warehouse being built by the Westinghouse Air Brake Company at Wilmerding, Pa., will be completed and ready for operation in about two weeks. About 600 additional men will be given employment in the new foundry as soon as it is completed.

The Secretary of State of Illinois has issued license to incorporate the Street Brakebeam Company of Chicago; capital stock, $250,000; incorporators, Monroe L. Willard, Noble B. Judah, and Solomon Webeles.

The Youngstown Car Company, of Youngstown, O., has built a large new foundry.

New Stations and Shops.

The Canadian Pacific will build a new station at London, Ont.

The new Fort Street Union passenger station at Detroit will be opened in about a month, though not likely to be entirely finished for some months longer. The iron viaduct leading to it is one of the longest elevated structures for heavy traffic in the country. It is two miles long and 14 to 16 ft. from the ground. It commands an attractive view of the river and shipping.

The Old Colony is building a new stone passenger station at Canton Junction, Mass., on the Providence division. The building is 25 ft. 8 in. wide and 87 ft. long and the material is Milford dark pink granite. The contractors are Darling Brothers & Co.

The contract for the foundations of the extension of the Broad Street station of the Pennsylvania Road at Philadelphia has been given to George W. Roydhouz, of 24 South Seventh Street, Philadelphia, and he now has a large force of men at work clearing away the old buildings.

The Cleveland, Cincinnati, Chicago & St Louis is to erect a train shed at Terre Haute, Ind. Samuel Hannaford & Sons, the architects, will receive proposals for building the shed, at their office in Cincinnati, until Sept. 21.

Iron and Steel.

The York Iron Furnace, formerly located at Black River Falls, Wis., has decided to remove to West Superior, Wis., and will erect a large plant at that place. The furnace will produce five grades of charcoal pig and will employ at the start 200 men.

The Ellwood Steel Company, of Ellwood, Pa., has been granted a charter with a capital stock of $100,000. This concern put up an extensive plant for the manufacture of steel sheets. The contract for the erection of the mills has been awarded to the Leechburg Foundry & Machine Company, of Pittsburgh.

C. M. Schwab, general superintendent of the Edgar Thomson Steel Works, has recently inaugurated a new scheme to stimulate the workmen to put forth their best efforts. Mr. Schwab proposes to give prizes of $20 each month to the scraper, pourer, blower and heater on whose turns the least number of second-class rails are produced. It is said that this plan has been tried before with excellent results.

A New Street Railroad in Chicago.

A contract has been signed between the West & South Towns Street Railway Co. and the Chicago Railway Construction Co., which provides for the construction of a double track road from near Lawndale Station on the C., B. & Q., through the lumber districts, to connect with the tracks of the South Side Co. Pennsylvania Steel Co.'s 7-in. girder rails, weighing 80 lbs. to the yard, will be used. The construction is to be begun at once. The form of motive power has not yet been decided upon, but it is probable that electricity will be used.

A Six-Track Drawbridge.

It is proposed when the Illinois & Michigan Canal is widened and made into a drainage canal to build a six-track drawbridge in place of the three double-track bridges which now cross the canal near Western avenue and Thirty-first street in Chicago. The railroads crossing at this point are the Pittsburgh, Cincinnati & St. Louis, the Chicago & Northern Pacific and the Union Stock Yards Transfer Co. The Central pier is to be 94 ft. in diameter, built hollow, with walls 10 ft. thick. The channel on each side of the pier is to be 100 ft. wide.

Axle and Tire Failures on English Railroads.

There were in the quarter ending March 31, 153 failures of tires in Great Britain and Ireland. Five were engine tires, three were van tires, and 145 were wagon tires; of the wagons 115 belonged to owners other than the railway companies; 127 tires were made of iron and 26 of steel. One of the tires was fastened to the wheel by Mansell's patent method, one by Gibson's patent method, 100 by bolts or rivets, 12 by other methods, and 39 by methods which were not stated; 16 tires broke at the rivet holes, 21 in the solid, and 116 split longitudinally or bulged. Of the 71 axles which failed 44 were engine axles, viz., 35 crank or driving and 9 leading or trailing; 6 were tender axles, 1 was a carriage axle, and 20 were wagon axles. Eight wagons belonged to owners other than the railway companies. Of the 35 crank or driving axles, 5 were made of iron and 30 of steel. The average mileage of 5 crank or driving axles made of iron was 280,641 miles, and of 30 crank or driving axles made of steel 227,936 miles. This appears to support the contention that an iron crank shaft is better than one of steel. —*The Engineer.*

Master Car Builders' Standards.

The letter ballot, which closed Aug. 31, resulted as follows:

SUMMARY OF VOTES AND RESULTS.

Subjects voted on.	Number votes cast. Affirmative.	Negative.	Total.	No votes necessary for adoption.	Results of letter ballot.
Change in wheel guarantee	503	311	814	543	Rejected
M. C. B. coupler gauges	734	49	813	543	Adopted

There is therefore no change in the standard wheel guarantee as printed in the proceedings of 1891.

The M. C. B. coupler gauges adopted as standard by this letter ballot are the gauges shown in the Executive Committee's circular of September, 1891, and also shown in the circular relating to letter ballots. These gauges will be shown in the proceedings of 1892.

The Proposed Rehabilitation of the Panama Canal Scheme.

M. Monchicourt, the liquidator of the Panama Canal Company, and M. Hielard, the Vice-President of the Paris Chamber of Commerce, who acted as the head of a financial group, have just concluded the arrangements, heretofore noticed in the *Railroad Gazette*, for the creation of a new company with a capital of 150,000,000 francs to immediately resume prosecution of work on the Isthmus, so as to prevent the concession granted by the Columbian Government from lapsing. Work is to be concentrated at two points, on the Culebra cut and on the Chagres, and it is asserted that when nearly the whole of the new capital has been usefully employed two-thirds of the canal will have been completed. The new company will then take over the assets of the liquidator of the bankrupt company, which comprise some 900,000 lottery bonds and the shares of the Panama Railroad. In conformity with the law this agreement has been submitted to the Tribunal of Commerce, and, having received its indorsement, the Parisians are said to have every hope of carrying out the new arrangement, at least so far as to raise the additional capital.

Electric Locomotives for the St. Clair Tunnel.

The adoption of electricity for operating the Baltimore & Ohio Belt Line tunnel in Baltimore has called attention to the applicability of electric locomotives to tunnel service, and it is now reported that the Grand Trunk is considering the problem of hauling its trains through the St. Clair tunnel by means of electricity. As this company is now using the largest decapod locomotives ever built, weighing 195,000 lbs. on the drivers, for this purpose, it is evident that the problem to be solved is by no means an easy one.

An Electric Switching Engine.

Messrs. Mather & Platt, of Salford (Eng.), have recently constructed a heavy electric locomotive for use at some large iron works in Sweden. This locomotive is built for working with an electromotive force of about 300 volts, and in outward appearance is very similar to the locomotives on the City & South London. The motor is of the double armature type, the armatures be-

ing coanected to the axle through a 10 to 1 speed gearing. The current is collected from an overhead wire 16 feet from the rails, the collectors consisting of an iron bar at each end of the locomotive, carried on upright pipe pillars.—*London Correspondent Electrical World.*

The International Railroad Congress.

We chronicled a week or two ago the spectacular opening of the St. Petersburg session of this Congress. It was carried through in a blaze of glory, the delegates have been overwhelemed with invitations to entertainments and dinners, which culminated in a magnificent banquet at the Winter Palace. The session closed Aug. 31, and the next one is to be held in three years in London. Representatives of the press, except those employed by the Havas agency, were excluded from the sessions, and, consequently, the reports that have reached us are meagre and obviously for popular reading.

Block Signaling on the New York Central.

The erection of the signal bridges on the New York Central & Hudson River is proceeding fast. The general design of these bridges was shown in the *Railroad Gazette* some weeks ago. It is the purpose now to put in some of them on the Hudson River division in order to place the signals better at points where they are now somewhat obscured by foliage or other obstacles. It is expected that the Hudson Division will be running under the absolute block system within two months.

Large Drivers.

The New York Central locomotive No. 903 has been tried west of Albany, and within a day or two has been sent to New York to take its place in running the Empire State express. This engine is of the same class as No. 870, which was described in the *Railroad Gazette* of Sept. 18, 1891; that is, it is an 8-wheeler with 80,000 lbs. on the drivers, 58 in. boiler and 19×24 in. cylinders. The only difference in No. 903 is that drivers 87 in. in diameter have been put on; the drivers of No. 870 are 78 in.

New Engines for the Chicago Elevated Railroad.

The Baldwin compound locomotives which have been in use by the Chicago South Side Rapid Transit Railroad Co. have given such good results when tested in regard to their hauling capacity and starting power, with speed recorders, etc., and have proved so satisfactory in daily use that an order has been recently placed for 25 engines which are to be exact duplicates of those first ordered. The dimensions of these engines are as follows:

Cylinders, 9 and 15 × 16 in.
Boiler, straight top, 46 in. in diameter.
Firebox, 64 × 44 in.
Flues, 167, 1¾ in. diameter, 76 in. long.
Driving wheels, 42 in. in diameter.
Truck wheels, 26 in. in diameter.
Weight on driving wheels, 40,000 lbs.
Weight in working order, 56,000 lbs.

These locomotives have shown themselves to be so economical that locomotive builders have not been willing to build simple engines to compete with them. The confidence of the management in the compound engines, as shown by the placing of this order, is a fitting comment on the remarks of a contemporary, lately, to the effect that their adoption was an experiment which no sensible engineer would have recommended, and that they appear to use more coal than simple engines would consume in doing the same work.

It is reported that the 10 engines of the same design, but of five tons greater weight, which have been in use on the Long Island Railroad, have shown a saving of 35 per cent. in suburban service.

Car Heating.

The New York, Lake Erie & Western has issued a circular to connections announcing that it will decline to receive cars to be hauled in passenger trains in the state of New York, unless they are fitted with pipes and McElroy couplers so that they can be heated from the locomotive.

THE SCRAP HEAP.

Notes.

The Central of Georgia has reduced the wages of a number of station agents and other employés.

The collieries controlled by the Philadelphia & Reading have been ordered to work four days a week instead of three.

At Buffalo last week four striking switchmen charged with interfering with non-union switchmen on the Lehigh Valley road were held in $1,500 bail each for the Grand Jury.

The work of relining the Coosa Mountain tunnel of the Columbus & Western is now kept up night and day, and it is expected to resume regular traffic through the tunnel within a week or two.

The California train robbers, Evans and Sontag, who robbed a train on the Southern Pacific several weeks ago, fatally shot three of their pursuers last Tuesday. The Southern Pacific Railroad and the Wells Fargo Express Company had offered $10,000 reward for the capture of the robbers.

On the night of Sept. 7 the express car in a train of the Missouri Pacific was robbed by two men at a station near Kansas City, the robbers having boarded the train at one station and having left it at the next. The robbery was not discovered by the trainmen for some time. The amount of money stolen is not stated.

The Superintendent of the Houston & Texas Central has issued an order requiring car loads of cotton to be placed at least 10 cars back from the engine, whenever possible. So many powerful engines have been introduced, permitting the making of long trains, that the danger to cotton from fire is said to have been greatly reduced.

On the night of Sept. 8 a train on the Atchison, Topeka & Santa Fé was attacked by robbers at Wharton, a water station in the Cherokee Strip, and the express car broken open, but after trying for some time to break the safes, the robbers gave up and went away. The passengers were intimidated by pistol shots; these were returned by the trainmen, but the robbers got away nevertheless.

The Erie has issued an order discontinuing the sale of the half-a-cent a mile books which it has heretofore issued to employés. In place of these books there will be substituted a 500 mile book at two cents a mile. This virtually abolishes the employés' mileage books, the use of which, it is said, has been greatly abused. The employés will receive personal passes for long distances and for short distances will have to pay two cents a mile.—*Buffalo paper.*

The tracks of the Baltimore & Ohio and the West Virginia Central & Pittsburgh have been connected at Keyser, W. Va., and at Rawlings. This is done to avoid possible delays on either roads by wrecks or wash-outs along the part of either lines between the two points. It is said that within the past year the Baltimore & Ohio has been compelled to use the tracks of its neighbor five times owing to occurrences over which it had no control, and the West Virginia Central has been dependent upon the Baltimore & Ohio nearly as often.

World's Fair Notes.

The Chicago *Herald* has begun the circulation of a petition to have the Fair grounds opened on Sunday, and it is already receiving a great many signatures.

Arrangements have been completed by which excursion trains to the Fair over all roads entering Chicago will run directly to the Exposition grounds and into the general terminal station.

Work is being pushed in all departments with the expectation of getting the buildings and grounds in reasonably complete condition for the dedicatory exercises to take place Oct. 19 to 22. The manufactures building and machinery hall are the only main buildings which are as yet unineclosed. Seventy buildings are now in various stages of completion on the grounds.

The steamship and railroad companies of England will make a very interesting exhibition in the transportation department. The London & North Western will send over a complete train headed by a compound locomotive. The Great Western will exhibit the "Lord of the Isles," one of the first locomotives used on that road. Several of the railroads will make exhibits of their systems of signaling. A very complete collection of models of battle ships, yachts, cruisers and merchant vessels is expected.

A World's Fair Hotel and Boarding Bureau has been organized with J. O. Curry, President of the Chemical National Bank, as President; L. W. Cass, Secretary, and W. D. Preston, Cashier of the Metropolitan National Bank; Chas. D. Warren and Geo. H. Heafford, General Passenger Agent of the C., M. & St. P., as directors. The object of this organization is to complete a list of approved hotels and boarding houses, and to have agents on all trains entering the city who will ticket passengers to whichever of these they may select as their stopping places. On application from the managers of hotels and boarding houses, such houses will be inspected by agents of the Bureau and must be approved before they will be recommended to visitors. This arrangement will doubtless prove to be a great benefit to visitors in saving them time and money and in preventing extortionate charges.

The Club Train.

What the Frenchmen call a *train de luxe* has been running between Paris and London since September, 1889, under the name of the "club train." The English part of the journey is made over the lines of the London, Chatham & Dover, and this company also provides the boats which take the passengers across the channel. From Calais to Paris the train is run by the Northern of France. The train, which is composed entirely of special cars (wagons-lits and a wagon-restaurant), is furnished by the Compagnie des Wagons-Lits. The journey is made from London to Paris in 7 hours and 47 minutes and from Paris to London in 7 hours and 30 minutes, one train each way being run every day. The London, Chatham & Dover stockholders now wish the train to be discontinued, because the number of passengers is not sufficient to pay the boat service.

A Novel Bicycle Railroad.

The Mount Holly & Smithville (N. J.) Bicycle Railroad was thrown open to the public on Sept. 13, and is to be operated regularly hereafter—that is, if passengers, furnishing their own motive power, desire the privilege of "operating" vehicles on it. A crowd of people congratulated the inventor, Professor Hotchkiss, on his success. The road is two miles long and is said to have cost $10,000. One or two persons can ride on a machine, and a novice can easily propel one a mile in four minutes. This railroad is described as a fence, on the top rail of which the bicycles run, propelled by the passenger, who pays a fare for the privilege. Guide wheels pressing against the side of one of the lower rails prevent the bicycle from turning over, so that no experience is required to ride them. The rider sits just high enough to clear the fence, so that the centre of gravity of the machine and rider is considerably below the centres of the wheels. The road runs through a romantic region so that where the grade is not ascending the passenger can enjoy scenery equal to any described in the publications of any thousand-mile railroad.

Reports to the Inter-state Commission.

At a session of the Inter-state Commerce Commission, held Aug. 12, the subject of annual reports required from the railroad companies being under consideration, it was ordered that the common carriers subject to the provisions of the act to regulate commerce shall, and they are hereby required to, file annual reports with the Inter-state Commerce Commission, pursuant to the 20th section of the act to regulate commerce, on or before the 15th day of September following the 30th day of June closing the year for which the report is made, and that the necessary blank forms for such reports be furnished to such common carriers by the statistician.

Snow Sheds Burned.

There were four fires in the Central Pacific snow sheds at Summit on the night of Sept. 9. The Summit fire train while fighting flames became surrounded by fire and had to be abandoned. The engine and water cars were wrecked by the flames. The Blue Cañon water train was hurried to the scene, but a new fire started west of the train, and for a time there was imminent danger that this train would also be destroyed. The water train from Rocklin was sent up early next morning and the flames got under control. Twenty-one hundred feet of sheds and track were destroyed and four passenger trains blockaded. The press dispatches reporting these facts state that the fires were incendiary.

The Hegewisch Car Works.

The plant of the United States Rolling Stock Company, at Hegewisch, Ill., was on Sept. 10 turned over to the United States Car Company, a corporation which has been formed under the laws of New Jersey. Work at these shops has been suspended since the failure of the United States Rolling Stock Company over a year ago, but will now, it is said, be resumed within thirty days, or as soon as the property can be put in good working order. The United States Car Company was put in possession on an order from Judge Gresham. The order permits the receiver, William C. Lane, to lease the plant to the new company for a rental equal to the amount paid in insurance, taxes and interest on certain of the mortgage bonds issued by the old concern. This amount the receiver estimates at $50,000 a year. The order was granted on the petition of the receiver, who averred that the offer of the United States Car Company was a liberal one, inasmuch as the expenses were eating up the property. The order was not secured without a protest from the attorneys of the unsecured creditors, who claim that the United States Car Company is a concern created by the stock and bond holders of the old company for convenience and to "freeze out" the unsecured creditors.

The Wreck of the "Western Reserve."

The steel steam barge "Western Reserve" broke in two on Lake Superior in a northwestern gale on Sept. 1. The vessel was on the up trip, light, from Cleveland to Two Harbors for ore. The passengers and crew, with the single exception of Harry Stewart, wheelman, were lost. The steamer was 300 ft. long, 41 ft. beam, capacity 1,965 net tons; built by the Cleveland Ship Building Co. in 1890, and launched on Oct. 20 of that year. She was valued at $220,000, and was considered a thoroughly staunch and seaworthy vessel. The disaster is very sad, as P. G. Minch, of Cleveland, the principal owner of the vessel, and several members of his family, were making the trip for pleasure. These, with the crew, numbered 26, of whom 25 were lost.

Misfortunes of the Whaleback "Wetmore."

The whaleback steamer "C. W. Wetmore" has gone aground on a sand pit in Coos Bay, Ore. The crew was saved, but the steamer is in a dangerous situation. She was loaded with 2,800 tons of coal for the Southern Pacific. She was built by the American Steam Barge Company, of West Superior, and after a trip to Liverpool went from New York around the Horn in 1890. She passed San Francisco Dec. 1 of that year with her rudder disabled, but continued her voyage, and off the Columbia River her propeller gave out. She was towed into Astoria by a tramp steamer, which recovered $20,000 salvage. In the following month she ran on the bar of Snohomish River, in Puget Sound, and was damaged. Later she was found to be leaking and had to be again repaired. On Feb. 10 she ran on a rock in Victoria harbor, and was again laid up for repairs. Last April, in going up the coast from San Diego to Victoria, she met heavy weather and had her bows stove in.

Nine Passengers Killed on the Fitchburg.

On Saturday night, Sept. 10, a suburban passenger train from Boston was run into at the rear by a freight train at West Cambridge, and the rear car, which was well loaded with passengers, was split open for nearly its entire length, resulting in the death of nine and the injury of 33 passengers. A correspondent sends us the following details:

The passenger train left Boston at 10:15 p. m. for Waltham via the Watertown branch. It was detained a short time at Charlestown, and arrived at the junction at West Cambridge about 10:34. Here it had to await the arrival of a train on the branch proceeding toward Boston, as there is only one track on the branch. When this had left the branch the waiting train started to go, but only the engine and two or three cars had got off the main track when an express freight, an hour or more behind time, which had left Charlestown about 10:30, and was running at a high rate of speed (25 to 30 miles an hour, some say; the engineer says 20), crashed into the rear car, ploughing its way nearly the whole length, killing nine passengers and injuring 33. There are both interlocking and automatic signals there, and the brakeman (a new man), was sent back with a red lantern, which the engineer of the freight says he did not see.

A fog prevailed at the time, but witnesses differ as to its density. The newspaper accounts are contradictory. One says that the conductor of the passenger train heard the whistle signal of the freight engine, acknowledging that the red light of the brakeman had been seen, but the freight engineman has stated that he saw no danger signal except the tail light of the rear passenger car. The line is perfectly straight for a long distance back of the point of collision. The details of the disaster were heartrending, some persons having been injured by steam from the locomotive, and fire having broken out in the wreck. The freight train was long and heavy, and was doubtless very hard to stop. No definite statement has been made as to how far the rear brakeman went back, but it was probably not more than 1,000 ft.

Index to Transactions Am. Soc. C. E.

An Index to Vols. I.-XXI. *Transactions* Am. Soc. C. E. has already been published. It is now proposed to issue with each volume of the *Transactions* an index for that volume, similar to that published in the June number for Vol. XXVI., these indices to be subsequently collated and published in book form at regular periods of about five years. An index to the four Vols. XXII.-XXV. is now in course of preparation and will be issued as soon as possible.

Charging by Time.

Aggrieved Passenger—"What! thirty cents from New York to Orange! Why, that's three cents a mile!"

Official (of the Delay, Linger & Wait R. R.)—"Yes, but it's only about twelve cents an hour."

Indiana Railroad Assessment.

The Indiana State Board of Tax Commissioners has just made up its list of railroad valuations. The total assessment of railroad property is $160,595,802, a decrease of $208,980 compared with a year ago. The Cincinnati, Wabash & Michigan was raised from $7,700 a mile to $14,000, and the Michigan Central from $18,000 to $25,000 a mile. The assessment of the Western division of the Peoria & Eastern was reduced from $27,000 to $25,000. These are the most important changes made.

Cholera Precautions.

On Wednesday a conference between the representatives of the State Boards of Health and of the railroad companies was held at Chicago for the purpose of adopting methods of preventing the spread of cholera. The meeting adopted rules recommending that every immigrant passenger before being allowed to land at any port or to cross into the United States shall obtain a certificate from the Health Office, setting forth the name of such immigrant, whence immigrated, name and port of clearance of vessel, and date of arrival at port of entry, the fact of the existence or non-existence of any infectious disease on said ship, the period of detention at quarantine, and further, a certificate that he or she is free from the danger of conveying Asiatic cholera or smallpox in person, and that his or her effects have been subjected to approved processes of disinfection before being allowed to enter into the states. That a certificate of disinfection shall be conspicuously attached to each piece of baggage of such immigrant. That any railroad or transportation company accepting immigrants for transportation who are not provided with certificates shall be subject to the quarantine rules of the states represented in the conference. That immigrant passengers, if not conveyed on separate trains exclusively devoted to such service, shall be transported, when practicable, in cars to which access shall be denied to other passengers, and the disinfected baggage, other than hand baggage carried by them, shall not be accessible to them until they have arrived at their points of destination. It was decided that the rules should go into effect on Sept. 20.

CAR BUILDING.

The South Baltimore Car Works have just completed twenty freight cars for the Eastern Ohio road.

The Baltimore & Ohio is receiving the last of 1,750 coal cars which were ordered some time since of the South Baltimore Car Works.

The Fitchburg has just completed twelve new passenger cars at its own shops, and about the same number are in process of construction now.

The Vandalia has ordered from the Terre Haute Car Manufacturing Co. 700 box cars, 150 coal cars, 100 furniture cars and 50 refrigerator cars.

Official returns show that for the 12 months ending June 30 last, Canada imported cars from the United States to the value of $80,058 against $203,544 during the same period of 1891.

The Illinois Central has ordered of the Wells & French Co. 175 special cars for World's Fair passenger traffic, and 100 similar cars of the Indiana Car & Foundry Co. This road has also given to the Missouri Car & Foundry Co. an order for 100 coal cars and to the Mount Vernon Car Co. for 100 box cars.

BRIDGE BUILDING.

Allegheny Valley Railroad.—This company is building new iron bridges at Red Bank, Philipston and Datters, Pa., and at three other places on the same division.

Chester, Pa.—A new bridge is to be built over Ridley Creek. S. A. Dyer is the officer in charge.

Florence, Ala.—The contract for the Memphis & Charleston bridge has been awarded to the Detroit Bridge Co. for $127,000. Work will be begun soon.

Lansing, Mich.—The city has appropriated $25,000 for a bridge 180 ft. long with a 40 ft. roadway, and two 12 ft. sidewalks. City Engineer E. O. Gellers has offered $100 for the best plan and specification.

Little Falls, N. Y.—The town board of this place has voted $25,000 for an iron bridge.

Minneapolis, Minn.—The Great Northern has rejected all the bids for the steel highway bridge on Third street, over the company's tracks and yards. On account of the high price of material, caused by trouble at the mills, it was decided to defer this work until reasonable bids are submitted.

Peterboro, Ont.—The contract for a new steel bridge over Mill Creek has been let to the Central Bridge Works of Peterboro.

Woodstock, N. B.—The work on the new Woodstock iron bridge is being pushed rapidly, and it is now expected that the granite piers will be completed Nov. 30. The bridge will rest on 11 piers and two abutments and will be 2,214 ft. long, having 12 spans, 9 of which will be 180 ft. long, the other three being 50, 100 and 250 ft. respectively. The piers are being built of gray granite, and will be 30 to 40 ft. high. At the foundation they will be 40 ft. long and 13 ft. wide.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

The Supreme Court of New Jewsey holds that the statute conferring upon cities the power to change grades of streets, whereby railroads entering said cities may relocate, change or elevate their railroads, is not limited to railroads in existence at the time of the passage of the act.[1]

In Nebraska the Supreme Court rules that a right of way, grading, culverts, etc., of a railroad company, running through two or more counties, where the property has been owned for years, and where there is no superstructure thereon, is subject to assessment by the local assessors, under section 39 of the revenue law, which makes a railroad running through several counties assessable as a whole by the state board, put declares that all real estate and personal property outside of the right of way and station grounds shall be assessed by the local assessors.[2]

In Texas the Supreme Court holds that in an action against the receivers of a railroad company for injuries to an employé resulting from the defective condition of the track, where it is not sought to charge the receivers personally, it is no defense that the defect existed when the receivers took possession, and that they had not been in charge a sufficient time to enable them to repair it.[3]

In Kentucky the Court of Appeals decides that a railroad company which has bought a road already built is not responsible for injuries caused by the negligent running of trains over its road before it bought the road.[4]

In New York the Court of Appeals rules that the consolidation of a New York railroad corporation with companies organized under the laws of other states is not an incorporation under the laws of New York, within the meaning of the laws of 1886, requiring the payment of an organization tax.[5]

The Supreme Court of the United States decides that State legislatures have power to fix maximum rates of railroad passenger fare, and the courts can only interfere therewith to protect the roads from unreasonable rates. The decision arose under a statute of Michigan, fixes a maximum rate of two cents a mile on all railroads whose gross yearly passenger earnings exceed $3,000, but makes no regulations in regard to freight charges.

The court held that the court below properly refused to decide that the law was unconstitutional in its application to the road in question, merely upon an agreed statement showing that its income at existing rates was entirely consumed by operating expenses and fixed charges, and the testimony of two of its officers that an increase of freight rates would diminish its income by throwing business to competing roads; since such an instruction required the court to hold that this testimony was conclusive in law, and to assume as a matter of law that a reduction in passenger fares would not bring an increase of travel sufficient to equalize the earnings.[6]

A North Dakota statute provides that in lieu of any and all other taxes upon any railroad . . . or upon the equipments, appurtenances or appendages thereof, or upon any other property . . . belonging to the corporation owning or operating such railroads, or upon the capital stock or business transaction of such railroad company, there shall be paid into the treasury a percentage of the gross earnings of the corporation arising from the operation of the railroad. Section 5 provides that the lands of a railroad company "shall become subject to taxation in the same manner as other similar property, as soon as the same are sold," etc. The Supreme Court holds, construing all the provisions together, that the act exempted land of a railroad company from taxation, and all other property lawfully owned by it, whether used in the operation of its roads or not.[7]

In Texas the Supreme Court rules that a receiver is not a "proprietor, owner, charterer or hirer," within a statute giving a right of action for injuries resulting in death caused by the negligence of the proprietor, owner, charterer or hirer of a railroad, etc., or by the negligence of their servants or agents.[8]

Injuries to Passengers, Employees and Strangers.

The Supreme Court of Utah rules that full fare may be collected of a passenger attempting to ride on a scalper's ticket conditioned to be void if presented by any other than the original holder, notwithstanding the passenger purchased it on the assurance of an unauthorized agent of the company that it would be honored. The fact that the ticket was not signed by the original purchaser is of no moment, as by accepting it he was bound by its terms.[9]

In Texas the Supreme Court holds that where no fraud or unfair means of deception have been resorted to by a carrier in selling a round-trip ticket containing a condition that it shall not be good for a return passage unless the ticket holder shall identify himself as the original purchaser to the satisfaction of the carrier's agent at the point of destination, and unless the ticket is signed and stamped by said agent, the assent of the ticket holder to the condition will be conclusively presumed, although he may not have signed the ticket; and the ticket holder may be ejected from a train for failure to comply with such a condition, though he may offer proof of identification to the conductor.[10]

In New York the plaintiff's intestate rose from his seat in the car as the train was approaching his home station and went to the rear platform and when 900 ft. distant from the station either voluntarily stepped from the platform, or was thrown therefrom by the momentum of the train. The Supreme Court decides that the fact that there was no brakeman on that end of the car to stop deceased, if he attempted to step from the platform, was not negligence on the part of the railroad company; it being no part of a brakesman's duty to prevent men from standing on the platform, nor to catch them when they jump off or fall off.[11]

In Minnesota, the plaintiff having entered the wrong train of cars as a passenger, the conductor stopped the train, not at a station, in order that he might get off and walk along the track to a train pointed out by the conductor, which would carry him to his destination. The Supreme Court holds that the conduct of the passenger in availing himself of this opportunity being voluntary, he ceased to be a passenger after leaving the train, and was not entitled to recover for injuries sustained by falling into a cattle-guard on the track.[12]

The Supreme Court of Michigan decides that notwithstanding the statute requiring all railroad companies to fill or block the frogs, switches and guard rails, there can be no recovery for the death of a brakeman, who, while voluntarily attempting to uncouple movable cars, gets his foot caught in an unblocked split switch, when it appears that he had been several years in the employ of the company, was familiar with the switches and track where the accident occurred, had been warned by the written rules of the company, which he had read, not to enter between the cars in motion to couple or uncouple them, and had signed an acknowledgement when he became brakesman that he knew the duties were dangerous, and that he had read the rules by which he had been governed[13].

In Texas in an action for personal injuries sustained by plaintiff while in defendant's employ as a brakeman, plaintiff testified that when he attempted to apply the brakes the shaft broke, causing him to fall to the ground; that he afterward examined the broken shaft, and found an old break about one-third of the way through; and that he knew nothing of the defect until after the accident. Defendant's evidence was that it kept a sufficient number of inspectors, and that there was one at the station near which the accident occurred, whose duty it was to inspect all cars, but there was no evidence that the car in question had been inspected. One witness testified that the shaft appeared to have been welded at the place of fracture, that there was a sliver caused by imperfect welding about an inch above the fracture, but that there did not seem to be any old fracture. The Supreme Court holds the railroad not liable.[14]

In Arkansas in an action for the death of one of its locomotive engineers in a wreck of his engine caused by an obstruction on the track, it appeared that the obstruction was due to a landslide caused by the falling of a large rock from the mountain near which the railroad ran. Part of the rock, which rested on the mountain side at an angle of 55 degrees, and only 50 ft. from the track, was exposed to view, the other end being imbedded a few feet in the ground. Plaintiff's witnesses testified that it had been observed for a long time by them, and regarded as dangerous, and that the rain running down the mountain washed the earth from under it, and caused it to fall; that defendant's section foreman stated to a witness on the morning of the accident that he had observed the dangerous position of the rock before the accident, and called the roadmaster's attention to it, suggesting that the stones along the mountain were dangerous. There was evidence for the defendant that some years before the accident it had the mountain side carefully examined, and removed all stones that appeared dangerous; that the rock in question had been observed by its employés, and was not regarded as dangerous; and that it had exercised reasonable diligence to prevent accidents from landslides. The Supreme Court holds the railroad liable.[15]

The Supreme Court of Minnesota rules that a traveler has no right to attempt to cross a track in front of an approaching train at what is nothing more than a common country crossing, although it is within the limits of a city, or to use a part of the right of way within said limits as a footpath, relying on the belief that the trains will be run not to exceed the speed fixed by city ordinance.[16]

In New York, the deceased, after leaving defendant's train at a suburban station, in order to reach the public highway, was compelled to walk along defendant's tracks or to go through private property by a way over which travel was forbidden. While walking along the tracks toward the highway he stepped from one track to another to avoid a train, and was struck by a train coming from the opposite direction and killed. The Supreme Court holds that no safe way having been provided by the company for reaching the highway, the court properly refused to adjudge deceased guilty of contributory negligence in using the tracks.[17]

In Massachusetts it appeared that at the place where deceased was killed defendant's and another road crossed a street within a few feet of each other; that deceased was riding on an ice-cart; that the driver thereof had no warning of an approaching train until he was on the tracks of the other road; that he was ordered by the gateman of the other road not to back his team; that defendant's gates were shut down before him; and he could not go on; that the horses became unmanageable, and broke through defendant's gates, and were struck by an engine of defendent's approaching at the rate of 20 miles an hour. The Supreme Court holds the railroad liable.[18]

The Federal Court of Appeals decides that when a passenger is injured by the collision of trains at a crossing of two railroads, each company is liable in full if its servants are negligent; and hence in an action against both it is proper to refuse an instruction requested by one, correctly defining the duty of the other with respect to the care to be exercised in approaching the crossing, and casting upon it the liability in case the jury found a breach of the duty. Both companies are bound to the same degree of care, and the instruction should be made applicable to both.[19]

In New York the plaintiff was struck by a hand-car while crossing the track to reach the station. Her view of the approaching hand-car was obscured by persons interposed and the smoke and steam of a freight engine near by. The Supreme Court holds the railroad liable.[20]

The Court of Appeals of West Virginia rules that the right of a father to recover for the killing of his four-year old child by a railroad train, while the child was sitting on the track, where it might have been seen by those in charge of the train by the use of ordinary care, is not defeated by the negligence of the child's mother in sending it into the vicinity of the railroad.[21]

[1] State v. City of Bayonne, 23 Atl. Rep., 648.
[2] Rep. Val. & W. R. Co. vs. Chase Co., 51 N. W. Rep., 132.
[3] Bonner v. Mayfield, 18 S. W. Rep., 205.
[4] L. & N. R. Co. v. Orr, 18 S. W. Rep., 8.
[5] People v. N. Y. C. & St L. R. Co., 29 N. E. Rep., 959.
[6] Chicago & G. T. Ry. Co. v. Wellman, 12 S. Ct. Rep., 400.
[7] N. P. R. R. Co. v. Barnes, 51 N. W. Rep., 386.
[8] Turner v. Cross, 18 S. W. Rep., 578.
[9] Drummond v. S. P. Co., 25 Pac. Rep., 733.
[10] Abram v. G. C. & S. F. Ry. Co., 18 S. W. Rep., 321.
[11] Herdman vs. N. Y., L. E. & W., 17 N. Y. Supp., 198.
[12] Finnegan v. C., St. P. M., & O. Ry. Co., 51 N. W. Rep., 127.
[13] Grand v. Mich. Cent. R. Co., 47 N. W. Rep., 857.
[14] Tex. & Pac. R. Co. v. O. Feil, 15 S. W. Rep., 33.
[15] Little Rock & Ft. Scott R. Co. v. Voss, 18 S. W. Rep., 172.
[16] Studley v. St. Paul & D. R. Co., 51 N. W. Rep., 115.
[17] Reid v. N. Y., N. H. & H. R. Co., 17 N. Y. S., 801.
[18] Marks v. Fitchburg R. Co., 29 N. E. Rep., 1,148.
[19] K. C., F. S. & M. R. Co. v. Stoner, 49 Fed. Rep., 299.
[20] Conklin v. N. Y. C. & H. R. R. Co., 17 N. Y. (Supp.), 651.
[21] Gunn v. O. R. R. Co., 14 S. E. Rep., 465.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlantic & North Carolina, 2 per cent., payable Oct. 1.

Boston & Albany, quarterly, $2 per share, payable Sept. 30.

Chicago, Milwaukee & St. Paul, semi-annual, 3½ per cent. on the preferred and 2 per cent. on the common stocks, payable Oct. 20.

Keokuk & Western, 1 per cent., payable Oct. 1.

Manhattan, quarterly, 1½ per cent., payable Oct. 1.

New York, New Haven & Hartford, quarterly, 2½ per cent., payable Oct. 2.

Sunbury & Lewistown, semi-annual, 4 per cent., payable Oct. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Addison & Pennsylvania, special, New York City, Sept. 26.

Alabama Great Southern, annual, Birmingham, Ala., Oct. 5.

Chicago, Detroit & Canada Grand Trunk Junction, annual, Detroit, Sept. 28.

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 21.

Cincinnati, Lebanon & Northern, annual, Cincinnati, O., Oct. 11.

Cleveland, Cincinnati, Chicago & St. Louis, annual, Cincinnati, O., Oct. 26.

Colorado Midland, annual, Colorado Springs, Col., Oct. 3.

Connecticut River, annual, Springfield, Mass., Sept. 21.
Illinois Central, annual, Chicago, Ill., Oct. 12, to consider an increase of stock from $45,000,000 to $50,000,000.
Kingston & Pembroke, Kingston, Ont., Sept. 19, to authorize the issue of new 5 per cent. bonds.
Lake Erie & Western, annual, Peoria, Ill., Oct. 5.
Louisville & Nashville, annual, Louisville, Ky., Oct. 5.
Louisville, New Albany & Chicago, annual, Indianapolis, Ind., Sept. 21.
Louisville, New Orleans & Texas, special, New Orleans, La., Sept. 30, and annual, Oct. 3, to consider a consolidation with the Yazoo & Mississippi Valley.
Manhattan, annual, New York City, Nov. 9.
Minneapolis & St. Louis, annual, Minneapolis, Minn., Oct. 4.
New York, New Haven & Hartford, annual, New Haven, Conn., Oct. 19.
New York, Ontario & Western, annual, New York City, Sept. 28.
New York, Pennsylvania & Ohio, annual, Cleveland, O., Oct. 12.
New York, Providence & Boston, annual, Providence, R. I., Sept. 21.
Northern Pacific, annual, Mills Building, New York City, Oct. 20.
Ohio & Mississippi, annual, Cincinnati, O., Oct. 13.
Ottawa, Waddington & New York, annual, Ottawa, Sept. 20.
Pittsburg, Youngstown & Ashtabula, semi-annual, 3½ per cent. on the preferred and 3 per cent. on the common stocks, payable Sept. 26.
St. Paul & Duluth, annual, St. Paul, Minn., Oct. 13
Richmond & West Point Terminal, special, Richmond, Va., Sept. 15, for the election of directors.
Toledo & Ohio Central, special, Toledo, O., Sept. 29, to consider the increase of the stock, the extension of the line and other matters.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual meeting at Lookout Mountain Hotel, Chattanooga, Tenn., Oct. 18.
The *Engineers' and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.
The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.
The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.
The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.
The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.
The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.
The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.
The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Broomfield street, Boston.
The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.
The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.
The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.
The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.
The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.
The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.
The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.
The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.
The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.
The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.
The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.
The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.
The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o clock p. m. on the first Friday of each month.
The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.
The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

Nova Scotia Mining Society.

The regular quarterly meeting of this society was held at Londonderry last week. After hearing a paper by Mr. R. C. Leckie, on "Improvements in Connection with the Londonderry Blast Furnaces" since he has been in charge, the meeting adjourned to visit the works of the company. At the works they were shown a new arrangement, consisting of a windlass and an endless rope, for the disposal of the slag, which does away with a locomotive and extra men, etc. The slag flows direct from the furnace into the bogies, which are immediately conveyed to the dump, where they are emptied by a door opening in the side, the molten slag flowing right down the side of the dump.
They then visited the calcination kilns, the first of the kind to be erected in Canada. The calcination is effected by gases from the blast furnaces.
The output of the work is four casts per day each cast being from 20 to 25 gross tons, 90 per cent. of which is No. 1 foundry iron. The industry at the mines and works when in full blast gives employment to about 1,000 men.
The Society met again in the afternoon and a paper on the "Iron Ores of Nova Scotia," giving the geographical and geological distribution, extent of ores, mode of formation, analysis, etc., was read by Mr. Small.

Roadmasters' Association of America.

The tenth annual convention of the Roadmasters' Association will be held Oct. 18 to 20 at Lookout Mountain Inn, Chattanooga, Tenn. After the morning session the Association will adjourn to Atlanta, Ga., to meet at the Kimball House for the two days following. Committees will report on the following questions, and their reports will be discussed.
The Best Proportion of Chemicals for the Steel Used in the Manufacture of Rails, and the Weight and Cross Section Which Will Secure the Best Results. Electric Signaling and Its Relation to Track Work. A Code of Rules to Govern Trackmen. Work Trains and Their Handling by Dispatchers. The Best Mode of Fastening Rails to Ties. Double or Single Target Switch Stands and Their Position on Single and Double Track. How to Take Care of the Right-of-Way and Fences. What Number of Men Can Work to the Best Advantage in Relaying Rails, and How Should the Work Be Divided to Secure the Best Results.
The Committee on Arrangements have arranged for a tour of South Carolina and Florida, including the cities of Charleston, Jacksonville, Tampa and St. Augustine.

The Western Railway Club.

This club will hold its first meeting of the season in its rooms, 850-854 Rookery Building, at 2 p. m., Tuesday, Sept. 20. This meeting is also the annual one, at which the election of officers for the ensuing year takes place.
In addition to the business above mentioned the subject of the "Irregular Wear of Locomotive Tires," presented at the May meeting by Mr. E. M. Herr, is to be discussed, and Mr. A. M. Waitt, of the Lake Shore & Michigan Southern, will read a paper on the "Heating of Railroad Passenger Cars."

The Western Society of Engineers.

The first meeting of the Western Society of Engineers, after the summer vacation was held Sept. 7, in the rooms of the Central Traffic Association in the Rookery Building, President Isham Randolph in the chair. The matter of a new seal and badge was discussed, but decision was postponed until the next meeting of the Society because of the small attendance. A communication was read from the American Society of Civil Engineers, asking the Society to provide a number of papers to be read at the Engineering Congress next year. The officers of the Society are actively engaged in making arrangements for the entertainment of visiting engineers during the World's Fair. A vote of thanks was given the World's Fair Board of Control for courtesies extended during the recent visit of the Society to the World's Fair grounds. Ex-Mayor Cregier is chairman of a committee, the members of which will be appointed during the week, to secure funds and designs for a monument to John Ericsson, the inventor. Mr. G. Hunter gave a brief description and exhibited a model of an improved stone hoisting and setting machine.

United Telegraphers of North America.

At the convention of commercial telegraph operators at Kansas City last week an organization seems to have been formed and officers were elected. We have seen no formal announcement of the name of the organization, but the above is given in one report. It seems that a large faction were dissatisfied with the action taken. The names of the officers are given as follows: Supreme Chancellor—S. J. Bear, Topeka; Supreme Vice Chancellor—W. S. Fender, Kansas City; Supreme Secretary and Treasurer—N. M. Gibbs, Kansas City; Executive Committee—C. E. Bruce, Kansas City; N. W. Cathins, of Mississippi; T. D. Rose, Chicago; M. W. Russell, New York; J. J. McNavin, Memphis; J. D. Walker, San Diego, Cal.

PERSONAL.

—Mr. E. P. Reynolds, member of the railroad contracting firm of E. P. Reynolds & Co., died at Wymore, Neb., on the night of Sept. 11.

—Mr. M. O. Bellingrodt, late of the Southern Pacific Railroad, has been appointed Mechanical Engineer of the Department of Manufactures of the World's Columbian Exposition.

—Dr. W. L. Breyfogle, ex-President of the Louisville, New Albany & Chicago, was badly injured by a collision of a freight train with a handcar on which he was riding at Bedford, Ind., last week.

—Mr. J. H. Barrett, formerly General Superintendent of the Erie, has been appointed General Superintendent of the Buffalo, Rochester & Pittsburgh in place of Mr. George W. Bartlett, resigned.

—Mr. Charles H. Spafford, Sr., of Rockford, Ill., died in that place on Sept. 8, at the age of 73. He was the builder and former President of the railroad from Rockford to Kenosha, now a part of the Chicago & Northwestern.

—Mr. Joseph L. Hunter, Superintendent of the American Bridge and Iron Company Works, at Roanoke, Va., has sold out his interests in that concern and is going to take charge of the blast furnace and machine shop at Covington, Va.

—General Levi W. Lawler, one of the Railroad Commissioners of Alabama, died at his home at Talladega, on Saturday last, at the age of 76. General Lawler had been in the legislature and was frequently a delegate to national democratic conventions.

—Mr. F. C. B. Avery, Manager of the New York Railway Supply Co., was found dead in his berth in a sleeping car at Blacksburg, S. C., on Saturday last. Mr. Avery was 29 years old, and had been connected with the New York Railway Supply Co. since 1890.

—Mr. Origen Vandenburgh died at his home in New York City on Sept. 10, at the age of 73. Mr. Vandenburgh had been a lawyer, but was known chiefly as the persistent advocate of an underground railroad in New York City, he having secured the passage by the legislature of a bill authorizing such a road in 1866. He had several times secured the favor of capitalists, and had spent many years in trying to secure the construction of the road. A suit to compel the city authorities to grant him certain permits was pending at the time of his death.

ELECTIONS AND APPOINTMENTS.

Canon City & Cripple Creek.—The directors of this new Colorado company are: Eben Smith, of Leadville; C. T. Harkinson and G. H. Hastings, of Denver; L. D. Roudebush, of Cripple Creek; B. F. Rockafeller and C. G. Newkirk, of Canon City, and Charles Henkel, Robert Gibson and David Wood, of Pueblo.

Chicago, St. Paul, Minneapolis & Omaha.—G. T. Darby has been appointed Acting Superintendent of Bridges and Buildings, with headquarters at Eau Claire, Wis., vice Benjamin Shute, resigned.

Connecticut & Passumpsic Rivers.—At the annual meeting in Newport, Vt., Sept. 7, John Mulligan and James A. Rumrill, of Springfield, Mass., were chosen directors in place of Messrs. Harris and Raymond, deceased. The rest of the old board were re-elected. William Blodgett was chosen president.

Dexter & Newport.—The annual meeting of the stockholders was held at Augusta, Me., Sept. 7, and the following officers and directors were chosen: President, George Fisher, Bath; Clerk, Josiah Crosby, Dexter; Treasurer, A. F. Bradbury, Dexter; Directors, James W. Bradbury, Alfred F. Bradbury, George Fisher and Oscar Holway, of Augusta, William D. Sewall, of Bath, F. W. Hill, of Exeter, B. F. Parrott, of Augusta.

Fitchburg.—John Medway has been appointed Superintendent of Motive Power in place of O. Stewart, with office at Boston.

Jacksonville, Tampa & Key West.—Receiver Young has appointed W. H. Macfarland General Auditor, in place of J. E. Starke, resigned.

Lake Superior Transit Co.—C. E. Markham has been appointed General Passenger Agent in place of T. P. Carpenter, who has resigned to go with another company.

Louisville, New Orleans & Texas.—Mr. C. T. Scaife has been appointed Superintendent of Terminals at New Orleans, with direct charge of all transportation department matters within the New Orleans Terminal District. Conductors and other trainmen will, as heretofore, be hired by the division officers of the New Orleans division, but when within the terminal district will be subject to the orders of Mr. Scaife.

Minneapolis, St. Paul & Sault Ste. Marie.—Charles T. Clement has been elected Secretary and Treasurer in place of William L. Martin, who has been assigned to other duties.
James Burke has been transferred from the Wisconsin and Peninsula division to succeed John McMillan, Roadmaster, deceased. Edward Burke has been appointed Roadmaster, with headquarters at Gladstone, Mich., vice James Burke, transferred.

New Westminster Southern.—This railroad company has elected the following directors and officers: President, Hon. H. Y. Thompson; Vice-President, P. P. Shelby, Seattle, Wash.; Secretary, T. J. Trapp, New Westminster, B. C.; Treasurer, A. Sawyer, St. Paul; Directors, J. C. Browne, G. C. Mayor, J. A. Foran and Alex. Ewen. Mr. Shelby was also elected General Manager.

Ohio Southern.—F. E. Fisher, Traveling Freight and Passenger Agent, has been appointed General Passenger Agent in place of D. H. Roche, resigned. Mr. Fisher's office is at Springfield, O.

San Antonio & Aransas Pass.—The stockholders, at their meeting on Sept. 7, elected the following Board of Directors: D. B. Robinson, A. C. Schryver, H. D Kampmann, William Huermann, E. P. Stevenson, J. Kennedy Tod, Uriah Lott, Henry Elmendorf and Reagan Houston. The directors held a meeting immediately afterward and elected D. B. Robinson, President; E. P. Stevenson, Vice-President; W. H. Field, Treasurer, and Reagan Houston, Secretary.

Southern Pacific.—James L. Boyle has been appointed auditor of the New York, Texas & Mexican and Gulf, Western Texas & Pacific railroads. His headquarters are at Victoria, Tex., vice R. S. Batson, transferred.

Toledo, Peoria & Western.—At the annual meeting of the stockholders in Peoria, Ill., Sept. 12, James Roosevelt, of New York; James A. Head, of Chicago, and E. F. Leonard, of Springfield, were elected directors. The two former were elected in place of E. N. Armstrong, of Peoria, and Joel R. Fisher, of New York.

Wabash.—The stockholders at their annual meeting in St. Louis elected the following directors: Francis Pavy, C. C. MacRae, Edgar T. Welles, Harry K. McHarg, T. H. Hubbard, C. J. Lawrence, George J. Gould, Russell Sage, John T. Terry, S. C. Reynolds, P. B. Wyckoff, Jay Gould and O. D. Ashley.

Warren & Farnsworth.—Following are the names of the officers of this Pennsylvania road: President, L. H.

Lapham, New York; Vice-President, F. H. Rockwell, Clarendon, Pa.; General Manager, F. H. Rockwell, Clarendon, Pa.; Secretary, A. Schlaet, New York; Treasurer, B. McOwens, Clarendon, Pa.; Superintendent, W. E. Henderson, Clarendon, Pa.; directors, L. H. Lapham, J. J. Lapham, A. Schlaet, of New York; F. H. Rockwell, T. G. Rockwell, B. McOwens and W. E. Henderson, of Clarendon, Pa.

RAILROAD CONSTRUCTION.

Incorporations, Surveys, Etc.

Annapolis & Atlantic.—This Nova Scotia company, which was chartered early in 1891 and which has the promise of Government aid, has ordered location surveys to be made from Shelburne, near the southern end of the peninsula, northeasterly, to a junction with the Nova Scotia Central, about 75 miles, with a view to the immediate construction of that portion of the line which, it is stated, will pass through extensive timber tracts in Shelburne County, and furnish communication with the mining towns in Queen's County which are being extensively developed. The Company hopes ultimately to extend the line to Halifax, with branches to Annapolis and Liverpool. R. G. Hervey, 15 Wall street, New York City, is President and Chief Engineer.

Callao & Southeastern.—This Company was chartered in Missouri Sept. 3 to build a railroad three miles long in Macon County, Mo. The incorporators are Jesse Miller, G. A. Mead and J. G. Miller, Sioux City, Ia., and Harry G. Earle, Isaac Simpson and Chas. H. Marmaduke, Callao, Mo.

Canon City & Cripple Creek.—Articles of incoporation of this company were filed at Cañon City, Col., Sept. 5. The proposed line will run from Cañon City, on the Denver & Rio Grande, to Cripple Creek. The chief office is at Cañon City. The projectors are men interested in the Anaconda mines and the Denver & Rio Grande Railroad.

Catskill & Tannersville.—This company was incorporated Sept. 14 with a capital of $80,000 to construct a narrow gauge road in Greene County, N. Y., about seven miles long, from the westerly terminus of the Otis Elevating Railroad to Tannersville, and a branch line from Haines' Falls to Santa Cruz Park.

Chicago, Rock Island & Pacific.—The company has opened its line to Terral, on the Red River, putting 44 miles of new road into service. The new stations, in order, are Duncan, Addington, Sugden, Ryan and Terral.

This company has completed arrangements for building its line southward from Lincoln, Neb., and work has been begun. The contractors are Edward McCormick, of Omaha; Patrick Mears, of Lincoln; Thomas Donohue, of Omaha; Thomas Atchison, of Denver; and James Stevenson, of Omaha. Together these contractors will employ 1,000 or 2,000 men, they say.

Chicago & West Michigan.—It is said that this company has made a survey from New Buffalo, Mich., westward to Michigan City, Ind., about 10 miles, and that the engineers have also looked over the line westward from there to Hammond, which is close to the line between Indiana and Illinois. New Buffalo is the southern terminus of the main line of this road, where it connects with the Michigan Central, over which its business is taken to and from Chicago. The proposed line would be parallel to the Michigan Central.

Crystal River.—Work is to be begun at once on this Colorado road, which was described in the *Railroad Gazettte* of Sept. 2. Messrs. Orman & Crook have received the contract for about 12 miles, and the line from Carbondale to Crystal as well as that from the mouth of Coal Creek to Coal Basin will be built at once. As before stated, this line is undertaken primarily in the interest of the Colorado Coal & Iron Co., for the purpose of reaching valuable deposits of anthracite and bituminous coal.

Dakota, Wyoming & Missouri River.—This company now has about 90 miles under construction, on which about 85 per cent. of the grading and bridging has been completed. The line runs in a northwesterly direction from Rapid City, S. D., through Scott's Mills, Big Bend, Pactola, Silver City and Mystic. The company hopes to build eastward from Rapid City, the objective point being Chamberlain, S. D.

Fifth Ward Transfer.—This railroad company has been incorporated in Minnesota to acquire and construct railroad lines in St. Paul for the purpose of connecting the various railroads entering the city with the tracks of the Minnesota Transfer. Capital stock, $50,000. The incorporators are M. W. Kerwin and Morris E. Ward, Chicago, and B. B. Gabusha, Mark Costello and L. L. May, St. Paul.

Flava Land & Development Co.—This is the name of a company that has been incorporated in Oregon with authority to build a railroad from the mouth of the Columbia to Salem, via Tillamook and Sheridan. Capital stock, $3,600,000. The incorporators are S. H. Brown, Jr., L. B. Seeley, N. G. Reed and E. L. Dwyer.

Great Northern.—Shepard, Siems & Co., of St. Paul, who have the contract for building the Pacific extension to the summit of the Cascades, report 130 miles of track laid beyond Spokane. The grading beyond that point is well under way, and will be finished by Nov. 1. It will require about 30 days' work to lay the track after that time; but on account of the delays in constructing bridges it will probably be the middle of December before the tracklaying is completed. Pending the erection of the steel bridge across the Columbia River transfer boats will be used. Shepard, Henry & Co. have the balance of the contract, and are working east from Puget Sound to the Cascades. Every effort is being made to have all the track completed before the first of the year, and, unless unforseen obstacles are encountered, this will be accomplished.

Hamilton Coal & Iron Co.—This company, recently incorporated in Washington, will not only operate and maintain mines, mills, smelters, coke ovens and operate and maintain steamboat and telegraph lines, but also has power to build a railroad from Hamilton westward, 10 miles, to Sedro, Wash. Capital stock, $2,000,000. Incorporators: Samuel H. Nichols, J. B. Hawley, Creda E. White, A. F. Burleigh and C. J. Smith. Principal office, Seattle, Wash.

Holston Valley.—A charter was issued for this company in Tennessee, Sept. 10, by the Secretary of State. The road is planned to run from Bristol, Sullivan County, eastward to Damascus, 45 miles.

Iron Range & Huron Bay.—The tracklaying on this road, which is being built from Huron Bay, Mich., southward to Champion, 32 miles, will probably be finished this month. The work is being done by the railroad company's men, the contractors who graded the road having finished their work and left. This company has ordered a survey to be made from Champion eastward to Ishpeming and Negaunee, about 20 miles, with the intention of extending the road to those places in the near future. This 20-mile line would be parallel to the existing roads of the Chicago & Southwestern and the Duluth, South Shore & Atlantic.

Mexican Southern.—The *Mexican Financier* reports that the parties interested in what is known as the "Fenelon Concession," granted in January, 1888, for the construction of a line from Oaxaca to Tehuantepec, are understood to have let contracts for the construction of six miles of road. The account further states: "It appears that by this concession the parties are authorized to build a line from Oaxaca to Tehuantepec, the route for which is specified as far as Miahuatlan, but not beyond. They have five years within which to commence work and present their plans, and a further seven years to finish the line to Tehuantepec. The government further grants them a subsidy of $4,500 a kilometre if they build a road of 2 ft. 5½ in. gauge, or a subvention of $6,000 a kilometre if they build a road of 3 ft. gauge. The concession further states that no subsidized line can be built within fifteen leagues on either side of the Fenelon line. In view of the fact that the parties interested in the Mexican Southern have a concession from Oaxaca to Tehuantepec, with the right to a subvention of $2,400 per kilometre per annum for 15 years, it appears impossible that the owners of the Fenelon concession can seriously contemplate building any part of their line in opposition to the Mexican Southern. Further, those interested in the Mexican Southern have also a concession for a branch from Oaxaca to Miahuatlan, which branch they have agreed to build for the government without subsidy. It is to be regretted that duplicate concessions of this nature should exist, as it might give rise to an attempt on the part of speculators to prejudice the minds of parties not well acquainted with the facts against an enterprise of real value to the country, and which has already proved the same by the building of an excellently constructed and complete line from Pueblo to Oaxaca."

Milwaukee & Northern.—It is reported that the company has decided to build a branch, leaving the main line at Wausaukee, Wis., about 60 miles north of Green Bay, to reach some valuable timber lands. The line will extend about 15 miles west from the main line, and the contract for building it has been let to McIntosh Bros., of Milwaukee, the same parties who have the contract for the 50-mile branch in Michigan.

Minneapolis, St. Paul & Sault Ste. Marie.—The bridges, which have delayed tracklaying on the extension to the international boundary, have been completed and rails are now being laid. Linton & Co. are pushing the grading with large forces of men and teams, which are scattered over almost the entire line under contract.

Montana Central.—Foley Brothers & Guthrie, of St. Paul, Minn., have the contract for rebuilding the washed out portions of the line between Great Falls and Helena, Mont.

Nashville, Chattanooga & St. Louis.—Mr. Hunter McDonald, engineer in charge of the line south from Huntsville, Ala., which is now under construction, informs us that the contract for the grading, masonry and timber work on that line has been let to A. L. Nickols & Co., of Huntsville, Ala. The track laying will be done by the railroad company, and it is expected that the road will be completed by the 1st of January next. The work is very light most of the way. There will be about one mile of wooden trestle, averaging 25 ft. high. The maximum grade of the road is 53 ft. to the mile. We have referred to this road heretofore under the head of Tennessee & Coosa, which company is now owned by the Nashville, Chattanooga & St. Louis. The line of the extension here referred to passes one mile east of Whitesburg.

Natchez, Alexandria & Texas.—This road, the incorporation of which was noted last week, is projected to run through an extensive tract of rich pine forests in Louisiana and eastern Texas. The projectors say that enough capital is already subscribed to build 90 miles of the road, and engineers were to start this week to survey the line. The main office of the company will be at Alexandria, La.

New Roads.—The Glendon & Gulf Mining & Manufacturing Co., of Gulf, N. C., has commenced the construction of a railroad from Gulf up Deep River to Fair Haven, a distance of 10 miles.

Northern Pacific.—A survey is to be made for a branch from near Palmer, Wash., to the Cokedale mine of the Green River Coal & Coke Company, east of Franklin. The line will be a spur from the Green River & Northern, leaving that line a short distance north of its junction with the main line of the Northern Pacific and running down Green River about three miles.

Old Colony.—The Railroad Commissioners of Massachusetts will give a hearing, at their office in Boston, on Wednesday next, on the petition of the Old Colony for a decree by the Board, certifying that the public exigency requires the construction of a railroad from a point on the existing line of the Old Colony in the town of Sherborn through Natick, Dover, Wellesley, Needham, and Dedham to a point near Roslindale on the line of the West Roxbury branch of the Providence division of the Old Colony. The proposed line gives the Northern division a direct connection with Boston, and has already been surveyed. The trains of the Northern division now run to and from Boston over the Boston & Albany for 22 miles.

Ottawa, Arnprior & Parry Sound.—Construction on this line has reached within eight miles of Arnprior, a gang of men being now engaged between Kinburn and Galetta. It is also expected that another force of men will be placed at Galetta to work in the direction of Arnprior next week. The road is now graded, in sections, from where it crosses the Canadian Pacific, six miles out of Ottawa, to Kinburn Village. It is probable that the road will be opened between Arnprior and Ottawa by the end of November.

Pennsylvania.—The company is building a branch of the Pennsylvania Schuylkill Valley road from Spring City, Pa., across the river to Royers Ford. The work is being done under the direction of James H. Murphy, Assistant Engineer of the Schuylkill division, and the contractor is James Magraw, of Reading. The length of the line is about 1¾ miles. The bridge across the Schuylkill River is about 400 ft. long and consists of four spans of wooden Howe truss, with pile trestle approaches. The Reading runs through Royer's Ford, and the Pennsylvania, says a Philadelphia paper, had to have an ordinance rushed through the Royer's Ford Borough Council in quick time giving it the right to lay a track along the river. Before the Reading people realized what was being done a siding several hundred feet long had been laid down, reaching the most important mills.

The company has called for bids for the construction of a branch line of the Shamokin division of the Northern Central to reach the new breaker of the Richards Colliery of the Union Coal Co., near Mount Carmel, Penn. This line extends in a northeasterly direction from the Northern Central for a distance of about two miles. The work is quite light with maximum grade of 95 ft. per mile, and maximum curvature of 10 degrees. The branch will be constructed under the direction of Mr. Robert Neilson, General Superintendent of the Northern Central at Williamsport.

Potomac Valley.—This railroad, controlled by the Western Maryland, was opened for passenger traffic on Monday last between Hagerstown, Md., and Cherry Run, W. Va., 14 miles. The work of building the station buildings at Charlton, Clearspring and Big Pool is now in progress. This road, as our readers are aware, gives the Western Maryland a connection between the Philadelphia & Reading at Shippensburg, Pa., and the Baltimore & Ohio at Cherry Run, W. Va. The opening of the road was celebrated by an excursion with a large number of invited guests from Baltimore and other places.

Shelton Southwestern.—Articles of incorporation of this company were filed with the county auditor at Shelton, Wash., on Sept. 2. The incorporators are Allen C. Mason, Anthony Hayward, Stewart Rice and John Snyder, Tacoma, and H. K. Tremper and E. E. Crowell, of Shelton. The capital stock is $2,000,000. The new company is formed to operate the Mason County Central Railroad (a logging road), which was noticed in the *Railroad Gazette* of July 15 last. The new company also absorbs all the interests of Allen C. Mason in Mason County, including the railroad, the Shelton sawmill, timber lands, etc. The change is mainly a reorganization of the company to place the business in shape to extend the road. Bids for grading the new road have been asked, but work may not commence before spring.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—Vice-President Reinhart publishes a statement in which, among other things, he says: The Atchison property is in first-class condition. We pay no attention to the statements of so-called crop bureaus. Our figures for the harvest wheat crop show over 82,000,000 bushels in Kansas of a better grade than last year, while for the corn crop (now almost ready) from 155,000,000 to 188,000,000 of a good grade. These approximates are from our own sources of information, upon which we rely. Even had there been a much less corn crop this year, it would not have disturbed us, as we have plenty of business in sight for two years. Atchison's traffic from grain, although large, is a minor quantity compared with freight from other products. It very rarely gets as high as 15 per cent. for all grains, while products of mines, coal, ores, etc., alone are usually about 38 per cent. to 40 per cent. The latter, with general merchandise, is our standard business, and with a growing country such as Atchison's territory is, is constantly increasing. None of the Atchison's financial plans have resulted other than profitably for the bondholders since the reorganization of 1889, and the latest plan under which income bonds have now been converted into bonds bearing fixed rates of interest not alone assures benefits to bondholders, but to stockholders as well. It should be borne in mind that the stockholders have to the present time practically paid an assessment of 15 per cent. through absence of dividends. This, of course, is without reference to depreciation of value in stock when the reorganization was found necessary. Under the circumstances, the condition of the company three years since and now, with all obligations of the property placed on a firm basis, ample means for improvements provided for years ahead, with large business and increasing revenues and $2,500,000 less charges ahead of the stock, the holders of the latter will come in for their share of the benefits of the financial rehabilitation of the company in the not very distant future.

Brookline & Pepperell.—The road was formally opened for business on Sept. 8, the town holding a big celebration attended by the Governor and other distinguished guests. Forty-eight girls threw bouquets of flowers over the locomotive, and the Lafayette Light Artillery fired a salute. The town, at the same time, celebrated its 123d anniversary. This road is 16 miles long and extends from Brookline, N. H., in a southerly direction to the Greenville branch of the Fitchburg road at West Groton, Mass., running through Hollis, N. H., and Pepperell, Mass. The road is to be operated by the Fitchburg, and Brookline will have three passenger trains daily to and from Boston.

Canadian Pacific.—During the month of August the company's land department disposed of 24,400 acres at a realization for $81,000. The sales for the corresponding period last year were 9,000 acres at a return of $30,000. The falling off in the price is due to the fact that a large proportion of the sales were made in the Saskatechawan Valley, where the price for all lands is placed at $3 an acre. During the past eight months the company has sold farm land to the extent of $1,033,000.

Charleston, Clendinin & Sutton.—This road is now open for regular business from Charleston northeast to Sutton, W. Va., about 50 miles. At the last named place it connects with the West Virginia & Pittsburgh, which extends northerly to Clarksburgh and Fairmont, thus completing a new line through Central West Virginia to Wheeling and Pittsburgh.

Chicago Great Western.—It is announced by stockholders that Chairman Stickney is returning from Europe with all the money desired for additional expenditures, including those for the proposed extension to Sioux City and Omaha and a suitable Kansas City terminal.

Chicago, Greenville & Southern.—The company has filed with the Secretary of State at Springfield, Ill., resolutions adopted by the stockholders authorizing the issuance of bonds at the rate of $20,000 a mile for the purpose of raising money to purchase and equip a line of road extending from a point on the line of the Jacksonville, Louisville & St. Louis in Bond County to a point in or near Murphysboro.

Evansville & Terre Haute.—The directors have declared a dividend of 5 per cent, on the stock, making 14 per cent. paid for the year. At the same time they voted to increase the capital stock from $3,000,000 to $6,000,000, subject to the ratification of the stockholders in October. The new stock will be issued to present stockholders pro rata, and is to represent betterments heretofore made and paid for out of earnings.

Los Angeles Terminal.—The line from Pasadena to Altadena, Cal., six miles long, hitherto operated by this company under lease, has been bought outright, the sum paid for it being $70,000.

Manhattan (Elevated).—The Company reports its earnings for the year ending June 30, as follows:

	1892.	1891.		
Gross earnings	$10,695,978	$9,846,710	I.	$849,268
Operating expenses	5,425,348	4,975,141	I.	450,207
Net earnings	$5,270,630	$4,871,569	I.	$399,061
Other income	140,000	113,000	I.	27,000
Total income	$5,416,630	$4,984,569	I.	$426,061
Fixed charges	2,411,917	2,387,982	I.	23,935
Balance	$2,295,713	$2,596,587	I.	$399,126
Dividends	1,800,000	1,620,000	I.	180,000
Surplus	$1,195,713	$976,587	I.	$219,126

The company reports a total surplus of $3,871,558, and cash on hand $1,007,100, an increase of $891,374 over last year. Passengers carried 213,692,745, an increase of 16,978,546.

New York Central & Hudson River.—The gross earnings of this road and its leased lines for August were $4,061,441, and for the same month last year, $4,046,502, an increase of $14,939. The mileage of road operated this year was 2,006 as against 2,004 the year before.

New York, New Haven & Hartford.—The earnings for the year ending June 30 are reported as follows:

	1892.	1891.		
Gross earnings	$11,913,701	$11,323,617	I.	$590,084
Operating expenses	8,273,010	7,928,902	I.	344,108
Net earnings	$3,640,691	$3,394,715	I.	$245,976
Other income	189,248	188,364	I.	884
Total income	$3,829,939	$3,583,079	I.	$246,850
Fixed charges	1,667,647	1,681,983	D.	13,336
	$2,162,292	$1,902,096	I.	$260,197
Dividends	2,103,750	1,865,000	I.	238,750
Surplus	$58,542	$37,096	I.	$21,446

The company reports a total surplus of $4,007,716, an increase of $147,233, and cash on hand $199,865, a decrease of $519,900.

The Directors have voted to lease the Housatonic road, including all its controlled lines. The Housatonic is already owned in the interest of the New Haven company, so that the approval of the stockholders is assured. The New Haven will lease the Housatonic for an agreed dividend (one per cent., it is said), retaining the right to buy the property by exchange of stock. The Danbury & Norwalk and the New Haven & Derby are leased by the Housatonic, and the Housatonic will turn over these leases to the New Haven road. The stockholders of the Housatonic will vote on the lease at their meeting Oct. 18, the stockholders of the New Haven will take action at their annual meeting Oct 10.

Pennsylvania.—A considerable portion of the Cambria & Clearfield Railroad recently completed has been added to and is now being operated as a part of the Altoona Division of the Pennsylvania. The lines just placed in operation will be better understood by referring to the map of the Cambria & Clearfield published in the *Railroad Gazette* Aug. 5, page 588. They embrace the line from Cresson to La Jose, a distance of 35 miles; the line from Kaylor to Ebensburg, a distance of 5 miles, and that from Brubaker Junction to Hastings, a distance of 6 miles. In all 46 miles of new road have been added to the Altoona Division.

On Thursday of last week the Pennsylvania road purchased real estate in Philadelphia worth $205,000, completing the acquisition of a tract between Vine and Callowhill streets, east of Water street, on which it is proposed to build a freight house.

Quaker City Elevated.—The Philadelphia Traction Company and several companies which it controls have filed in the Common Pleas court at Philadelphia a bill in equity against the Quaker City Elevated to prevent the erection of an elevated railroad by the defendant. Counsel for the Traction Company cites two acts of Assembly which he claims make it illegal for the Quaker City Company to construct an elevated road on the route authorized by City Councils. The officers of the road sent to the City Councils' Railroad Committee last week a letter from Vermilye & Co., August Belmont & Co., and Edward Sweet & Co., New York bankers, stating that they had subscribed for the larger portion of the authorized capital stock of the Quaker City Company. They say further, it is their design to press the work to a rapid conclusion, and to furnish the city "with the most satisfactory means of rapid transit now in use."

Toledo & Ohio Central.—It is stated that the Toledo, Columbus & Cincinnati, which lies parallel to this road for about 70 miles southward from Toledo, and which is controlled by this company, is to be absorbed by consolidation at the meeting of the stockholders on Sept. 29. The present line of the Toledo & Ohio Central between Toledo and Columbus is roundabout, but the Toledo, Columbus & Cincinnati will make a direct line between these cities if it is extended from Kenton southward. The officers hope to build this extension after the consolidation has been effected.

Wabash.—The stockholders held their annual meeting in St. Louis on Tuesday, and elected the following Board of Directors: Francis Pavy, C. B. McRae, Edgar T. Weller, Harry K. McHarg, T. H. Hubbard, C. J. Lawrence, George J. Gould, Russel Sage, John T. Terry, S. C. Reynolds, P. B. Wyckoff, Jay Gould, O. D. Ashley. The new Directors elected were Messrs. Jay Gould, McKay and Pavy, the two latter of London, England. Messrs. Joy, How and Hays declined re-election, learning that the English security holders desired a larger representation on the board. It is understood that Messrs How and Hays will continue in their present places as Vice-President and General Manager, the by-laws having been altered at this meeting, so that it is not necessary to be a director in order to hold the office of vice-president. The new directors will meet in New York next week. In his annual statement President Ashley attributes the increase of operating expenses to renewals and repairs and purchase and maintenance of rolling stock. The gross earnings per mile are higher for 1892 than for any year since 1880 and the net larger than any since 1887 and 1890, with a lower rate per ton mile. The statement deplores the present low freight rates, but praises the work of the Western Traffic Association in securing steady maintenance of such rates by competing lines, a result, however, which it is held is largely attributable to the abundant crops supplying the freight traffic during the past year. The Detroit & Chicago extension will probably be completed this year. The $3,500,000 bonds to build it were sold and the cash deposited with the Central Trust Company.

TRAFFIC.

Traffic Notes.

It is announced that the Canadian Pacific will postpone its threatened reduction on westbound transcontinental freight.

The number of passengers traveling from Pittsburgh to Atlantic City over the Pennsylvania this summer on excursion tickets has been 4,078. It appears from a Pittsburgh paper that the round trip fare was $10.

The passenger department of the Pennsylvania road, always a little ahead of time, has issued a book of 100 pages, illustrating the attractions of the coming World's Fair at Chicago, and presenting the advantages of the Pennsylvania routes to that city. The book is handsomely printed and full of artistic sketches.

The interested parties in the contempt proceedings in the case of the Interstate Commerce Commission vs. the Illinois Steel Company, and the Wabash & Grand Trunk railroad Companies have agreed to a suspension of the case until Sept. 20, when it will be heard before Judge Gresham at Chicago. This is a case of contempt for refusal of the witness to answer questions.

The Northern Pacific has filed notice of its withdrawal from the Transcontinenal Association. The ground given is understood to be that an amicable agreement touching the Pacific Mail Steamship subsidy cannot be reached. This protects the Northern Pacific, and puts it in a position where at any time it may return to the Association, whereas it takes a notice of 90 days to withdraw.

A Philadelphia paper states that since securing possession of the Poughkeepsie Bridge railroad, the Reading has thrown "an immense amount" of business over this route, assuring its financial success. Anthracite and bituminous coal, grain and other Western products are sent eastward, and the New York & New England and Boston & Maine send large amounts of miscellaneous freight for Pennsylvania and Western points. Passenger engines have to be used on Sunday to move freight.

H. J. Rice, one of the South Dakota Railroad Commissioners, says that the railroads are taking every precaution to prevent a grain blockade similar to those of the past two years. The roads already have their tracks well filled with grain cars, have laid in an immense supply of coal, and have even gone so far as to hold cars sent out with coal, to help them through the busy season. The storage capacities of their side tracks and elevators have been largely increased. South Dakota will ship out more wheat this year than North Dakota and Minnesota together.

The Great Northern has issued a tariff on grain from North Dakota to Minneapolis and Duluth, effective Sept. 15, which reduces the existing rates from five mills to one cent per 100 lbs. If these rates are met by the Northern Pacific, as is probable, it will result in carrying the reduction into South Dakota by reason of the necessity for the "Soo" line meeting the reduction of the Northern Pacific, which will in turn involve the Chicago & Northwestern and Chicago, Milwaukee & St. Paul lines, and is likely to cause considerable demoralization in that territory.

The Central of New Jersey has withdrawn its tariff of through rates on coal to points on the Pennsylvania road, following the action taken by the Philadelphia & Reading, which was announced in this column last week. The Pennsylvania has issued new tariffs from its junction points to points on its own road, so that consignees receiving coal will pay the same rates over the Pennsylvania road as were paid under the joint tariffs. The officers of the Pennsylvania say that the advance on the Reading will make the total freight charge to be paid by the consignee about 30 cents a ton higher than heretofore. The Central of New Jersey delivered to the Pennsylvania at Phillipsburgh last year 1,808,365 tons of anthracite coal. The total amount of anthracite carried by the Pennsylvania in 1891 was 7,227,348 tons, of which 3,610,679 originated on its own lines. There are already some reports indicating that the collieries on the lines of the Pennsylvania will increase their output. The Philadelphia papers say that the prices charged by the Philadelphia & Reading Coal Co. for coal in that city have been adjusted so that the advance in the freight rates by that line to the city makes no difference in the prices of the coal; that is, that the price of coal at the mines has been reduced by the same amount that the freight rate has been increased.

A number of trunk lines have announced that they will not take emigrants westward from the Atlantic seaboard, the authorities of Illinois and other western states having issued very strict quarantine regulations in consequence of the presence of cholera in New York harbor and in Europe. At Detroit last week certain passengers (Italians were refused admission from Canada because of unsatisfactory records concerning their health, but it appears that the same passengers had just passed through the United States from New York City into Canada.

On Tuesday the Passenger Committee of the Trunk Line Association formally decided to sell no more third class tickets to immigrants for the present, this course being taken because of the refusal of Western connections to receive immigrants. Several of the companies were caught with a train load of immigrants at Buffalo, and had to board them at hotels until they obtained permits of good health. Some of them were brought back to New York. It was decided to discontinue the sale of second class tickets at Ellis Island also. The New York *Herald* says: "But an unusual number of immigrants have been anxious to pay first-class rates, and several of the agents got around the difficulty by taking immigrants to a barber shop for a clean shave, to a bath for an annual dip, and fit the travelers out with new collars and neckties, so that they passed for tolerably respectable first-class passengers. These immigrants got through all right, and were gladly received by the Western roads without any inquiry about their health."

The Texas Railroad Commissioners have now exempted nearly or quite all the important roads from the operation of the freight tariffs issued by the commission. Most people will probably agree with the Texas paper which heads this news—

"IT LOOKS LIKE THE COMMISSION HAS THROWN UP THE SPONGE."

Chicago Traffic Matters.

CHICAGO, Sept. 14, 1892.

The Transcontinental association meeting held here last week adjourned without, so far as is known, reaching any settlement of the numerous questions which were under discussion. The attitude of the Great Northern in respect to transcontinental rates, coupled with its withdrawal from the association, to take effect Jan. 1, did not tend to reassure the other lines, and the situation was still further complicated when the Canadian Pacific served notice of withdrawal on the same date. In the passenger meeting efforts were made to adopt a resolution discontinuing all European agencies and placing the control of all emigrant traffic in the hands of a joint committee at New York. This is the same plan which was proposed by the presidents some months ago and which failed to secure the requisite number of votes for its adoption. The lines were unable to agree to this and it was again abandoned. In the Freight Association the Canadian Pacific stated as its reason for withdrawing that the Southern Pacific insisted upon making lower rates westward on goods from Europe than on domestic freight, and would not recede from its position. Until it is definitely known what the attitude of the Great Northern and Canadian Pacific is to be there is little likelihood of any further attempt to relieve the situation. There is plenty of time, however, between now and Jan. 1 for an adjustment of the difficulties.

The southwestern lines were in session for several days last week discussing the situation in that territory. Some of the lines were dissatisfied with the way the traffic was moving, and a general discussion was had of the situation and what should be done to remedy the trouble. A satisfactory adjustment was reached and the meeting adjourned after adopting a preamble to the effect that arrangements should be made to divide competitive business and amend and strengthen present agreements coupled with a resolution appointing a committee to prepare and report a plan for the conduct of business covered by the agreements of the Western Freight and Trans-Missouri Associations. This committee are to report at a subsequent meeting to be called by Chairman Midgley.

The freight committee of the Central Traffic Association convened yesterday. Among the subjects under consideration are the following: Advisability of withdrawing all rates and divisions with Ohio River lines and charging tariff rates from depots on Ohio River crossings on traffic received from boats; revision of lumber rates; request of the Illinois Woman's Exposition Board for special rates on exhibits.

The Chicago-St. Paul lines are busy endeavoring to find out how they are going to get any of the New England-St. Paul freight business in the face of the recent reductions by the Canadian Pacific, cutting the westbound rates from $1.20 (first class) to 51 cents, with corresponding reductions on other classes. Chairman Midgley is in correspondence with the "Soo" line people endeavoring to bring about a restoration of rates. The action of the Canadian Pacific has been met by the lake lines with a reduction from $1.01 to 42 cents (first class) from New England points to St. Paul.

The lines in the Western Passenger Association have agreed to a modification of the rule adopted in regard to rates for the dedicatory exercises in connection with the World's Fair, Oct. 21, permitting a rate of one cent a mile for parties of 25 or more, when in uniform. The rate for all others will remain at a fare and one-third.

The fact that the Nickel Plate and Erie lines are carrying so large a proportion of eastbound shipments continues to prove a thorn in the sides of the stronger lines, who do not hesitate to insinuate that it is being done by means of concessions. As they are unable to prove this, they are obliged to content themselves with grumbling. Should they be able to establish a case against these lines it is safe to predict that there will be trouble.

The Commissioners of the Western Traffic Association announce a session for Sept. 20, for the hearing of various matters which have been referred to them.

Chairman Midgley has withdrawn the authority to return free attendants to the number of more than one in charge of a car of live stock, the same having been granted by mistake.

F. C. Donald, C. K. Lord and W. B. Shattuc, composing the Board of Arbitration in the Atchison Appeal case as to the eligibility of E. A. Ford to serve as the Atchison arbitrator in its original appeal have decided that Mr. Ford is eligible to act as arbitrator in the issue pending for which he was named, and they accordingly reverse the ruling of Chairman Caldwell, of the Western Passenger Association. Mr. Ford will now be one of three arbitrators to decide whether the Atchison was justified in making a $12 rate from Chicago to Denver and return on account of the Knights Templar conclave.

It is reported from St. Paul that the Great Northern has given notice of withdrawal from the Western Traffic Association, but nobody here has received official information of the fact, and the report is believed to be premature.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Sept. 10 amounted to 55,540 tons, against 59,018 tons during the preceding week, a decrease of 3,478 tons, and against 55,950 tons during the correspanding week of 1891, a decrease of 410 tons. The proportions carried by each road were:

Roads.	W'k to Sep. 10.		W'k to Aug. 27	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	9,566	17.2	8,649	14.7
Wabash	3,595	6.5	3,575	6.1
Lake Shore & Michigan South.	7,365	13.3	6,334	10.7
Pitts., Ft. Wayne & Chicago	4,855	8.8	7,183	12.2
Pitts., Cin., Chicago & St. Louis	8,434	15.2	7,612	12.9
Baltimore & Ohio	3,380	6.1	3,781	6.4
Chicago & Grand Trunk	4,395	7.9	4,086	6.9
New York, Chic. & St. Louis	5,913	10.6	7,573	12.3
Chicago & Erie	7,553	13.6	9,258	15.7
C., C., C. & St. Louis	484	0 8	657	1.1
Total	55,540	100.0	59,018	100.0

Of the above shipments, 1,879 tons were flour, 23,998 tons grain and millstuff, 8,848 tons cured meats, 11,421 tons dressed beef, 1,419 tons butter, 1,760 tons hides, and 4,397 tons lumber. The lake lines carried 86,876 tons, against 117,630 tons during the preceding week, a decrease of 30,754 tons.

GEO. WESTINGHOUSE, JR., President. T. W. WELSH, Supt. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE General Manager.

THE WESTINGHOUSE AIR BRAKE COMPANY

PITTSBURGH, PA., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE

The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 325,000 cars. This includes (with plain brakes) 252,000 freight cars, which is about 23 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording the opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 173,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception.

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154.107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

E. L. ADREON, Manager. JOHN B. GRAY, Agent. C. C. HIGHAM, General Supt.

THE

AMERICAN BRAKE COMPANY.

NEW YORK OFFICE, 160 Broadway, JOHN B. GRAY, Agent.

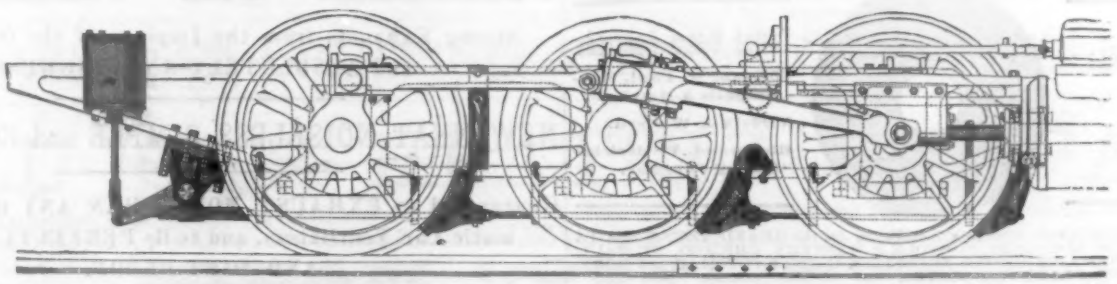
THE WESTINGHOUSE AIR BRAKE CO., Lessee,

MANUFACTURERS OF

CHICAGO OFFICE, GRAND PACIFIC HOTEL.

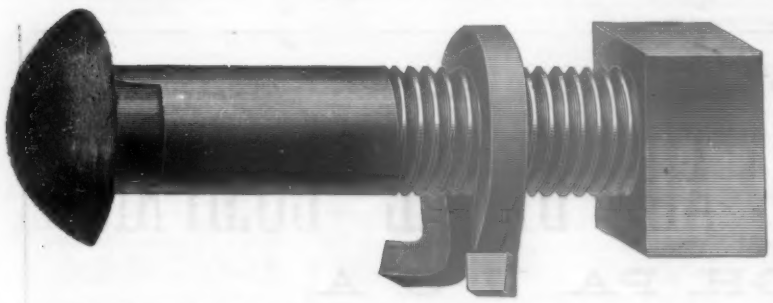
LOCOMOTIVE BRAKES.

General Offices and Shops, Second and Tyler Sts., ST. LOUIS, MO., U. S. A.



Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers furnished to operate with either STEAM AIR or VACUUM.

THE "STANDARD" NUT LOCK



Manufactured under D. O. Ward's Patents by the

STANDARD NUT LOCK CO.,

NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spri g steel, having horizontally inclined foot pieces, which are curved inward, thereby gr atly increasing the spring resistance and acting simultaneously: rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread* of *bolt*.

The nut lock for ⅞ bolt made of ¼ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any perma ntly placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

THE STANDARD COMBINATION TIE PLATE AND BRACE

POSSESSES THE FOLLOWING MERITS:

1. It prevents absolutely the canting of the rail into the tie, thereby greatly increasing the life of the tie.
2. It prevents the rails from spreading or canting over and wearing one side only.
3. The combination of the brace and plate obviates the necessity of spiking the rail and brace separately, thereby saving two spikes and securing the service of the *inside* spike for *holding* the rail; it also prevents the rail from working up and down, and laterally, thus making it impossible to wear the *neck of the spike*.
4. The plate and brace being made of malleable iron, is practically indestructible.

The tie plate and brace is especially useful for curves and guard rails, and also on bridges, whether the rail is laid on ties or on stringers. A tie plate without a brace will not save the head of the spike. A brace without a tie plate will not save the tie, and in a short time the rail will wear into the tie.

P. O. Box 288, PHILADELPHIA, PA. WILLIAM H. PHILLIPS.

Simple. Easily Applied. Very Effective.

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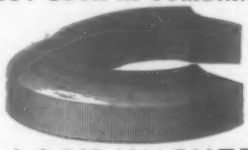
THE ONLY POSITIVE NUT LOCK IN COMBINATION WITH ELASTICITY.

Sixty Millions in Use in Railroad Track



For Use on All Kinds and Classes of Work.

Made for all sizes of bolts.

A trial is requested.

Samples free of expense.

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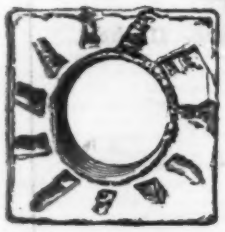
THE AMERICAN WASHER & MANUFACTURING CO.



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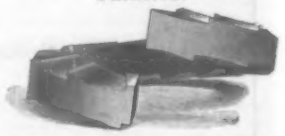
A Resilient Spiral Spring Washer with Ratchet-Shaped Teeth.

This is a positive lock, with spring temper, and will not cut thread of nut or bolt.

Patented.



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These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best Nut Locks known.

Sample lots furnished for trial, free of expense, by forwarding the distance between centres of fish-plate bolts. Correspondence and orders solicited.

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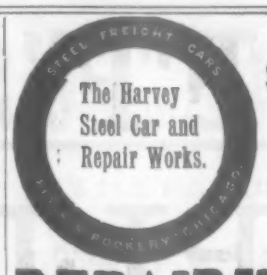

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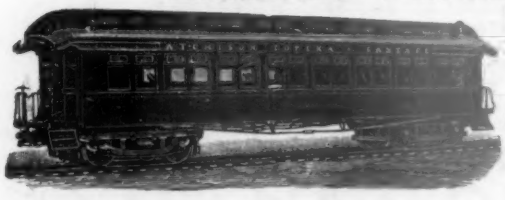
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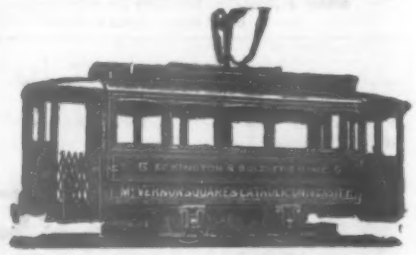

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UNITED STATES
ROLLING STOCK CO

AUCTION SALE

—OF—

RAILROAD CARS,

Locomotives and Material.

NOTICE

Is hereby given that pursuant to an order of the Circuit Court of the United States for the Southern District of New York, duly made and entered on the 6th day of July, 1892, in a cause therein pending between Henry D. Laughlin and others, complainants, and the United States Rolling Stock Company, defendant, and to orders conformatory thereof duly made and entered in the Court of Common Pleas for Champaign County, Ohio, on the 2d day of August, 1892, and in the Circuit Court of the United States for the Northern District of Alabama, on the 12th day of August, 1892, I, the undersigned, William C. Lane, Receiver of the property, assets and effects of The United States Rolling Stock Company, will sell at public auction for cash on the 26th day of September, 1892, at 10 o'clock A. M., at the works of the United States Rolling Stock Company, at New Decatur, Alabama, the following described rolling stock and material: 50 drop bottom coal cars, 3 coal cars, 28 refrigerator cars, 5 flat cars, 3 box cars, 1 locomotive, 807 new wheels, 23,400 lbs. scrap wheels, 62,400 lbs. axles, 193 automatic couplers, 77,837 lbs. bolts, nuts, etc., 90,000 square head bolts, 1,156,475 lbs. bar iron, forgings, castings, scrap, 60 tons coal, 842,214 ft. lumber, 3,777 gals. painters' material, 14,050 lbs. painters' material, 2,091 gals. oil, 15,902 brick, 208 ft. piping, 463 pieces sewer pipe, 4,585 ft. belting.

Also a large amount of general material used in the construction of cars, maintenance of machinery, etc.; also an assortment of office furniture.

And on the 27th day of September, 1892, at 12 o'clock noon, at the works of The United States Rolling Stock Co., at Anniston, Alabama, the following described rolling stock and material: 123 box cars, 88 flat cars, 15 gondola cars, 9 refrigerator cars, 1 locomotive, 5,157 car wheels, 411 automatic couplers, 977,851 lbs. axles, 88,151 lbs. bolts, rivets, nuts, keys, etc., 5,072,846 lbs. bar iron, pig iron, forge iron, castings, 89,730 lbs. steel bars, rails, etc., 1,245,757 lbs. scrap (forgings, cast, wrought, etc.), 861,120 lbs. coal, coke, etc., 512,730 ft. lumber, 4,870 gals. painters' material, 2,840 lbs. painters' material.

Also a large amount of general material and supplies used in construction of cars, maintenance of machinery, etc.; also an assortment of office furniture.

And on the 29th day of September, 1892, at 12 o'clock, noon, at the works of The United States Rolling Stock Co., at Ball Play, Alabama, the following described rolling stock and material: 2 flat cars, 1 locomotive, 5,850 ft. lumber, 110 second-hand steel rails; also a small amount of sundries.

And on the first day of October, 1892, at 10 o'clock A. M. at the works of The United States Rolling Stock Co., at Urbana, Ohio, the following described rolling stock and material: 20 box cars, 10 stock cars, 10 flat cars, 1 gondola car, 1 locomotive, 487 car wheels, 92 axles, 65,058 lbs. steel bar and sheet iron, 3,452 pieces forgings, 55,537 lbs. scrap forgings, 61,973 lbs. castings, 94,000 lbs. scrap, (cast, wrought, etc.), 91 tons coal, coke, etc., 163,808 ft. lumber, 782 gals. painters' material, 6,901 lbs. painters' material, 366 gals. oil, 154 ft. belting.

Also a large amount of general material and supplies used in the construction of cars, maintenance of machinery, etc.; also an assortment of office furniture.

A detailed list of the property to be sold will be furnished at the time and place of sale; and may also be obtained before that time upon application to the Receiver at his office, No. 45 Broadway, in the City of New York.

WILLIAM C. LANE, Receiver.

UNITED STATES
Rolling Stock Co.

AUCTION SALE

—OF—

Railroad Cars, Locomotives and Material.

NOTICE

Is hereby given that pursuant to an order of the Circuit Court of the United States, for the Southern District of New York, duly made and entered on the 6th day of July, 1892, in a cause therein pending between Henry D. Laughlin and others, complainants, and The United States Rolling Stock Company, defendant, and to an order confirmatory thereof duly made and entered in the Circuit Court of the United States, for the Northern District of Illinois, on the 27th day of July, 1892, I, the undersigned, William C. Lane, Receiver of the property, assets and effects of The United States Rolling Stock Company, will sell at public auction for cash, on the 3d day of October, 1892, at 12 o'clock noon, at the works of The United States Rolling Stock Company, at Hegewisch, Illinois, the following described rolling stock and material: One hundred and four stock cars, 28 box cars, 17 flat cars, 17 refrigerator cars, 14 gondola cars, 7 miscellaneous cars, 3 locomotives, 355 car wheels, 30 pairs of car wheels on axles, 148 axles, 414,169 lbs. bolts, washers an dnuts, 2,890 gross screws, 3,030,687 lbs. bar and pig iron, forgings, castings and coupling pins, 162½ tons scrap, 20,000 lbs. coke, 10,000 lbs. limestone, 2,100,000 feet lumber, 2,712 gals. painters' material, 14,860 lbs. painters' material.

Also a large amount of general material and supplies used in construction of cars, maintenance of machinery, etc.; also an assortment of office furniture; also a large amount of beds, bedding, chairs, carpets, shades, crockery, table and kitchen utensils.

A detailed list of the property to be sold will be furnished at the time and place of sale; and may also be obtained before that time upon application to the Receiver at his office, No. 45 Broadway, in the City of New York.

WM. C. LANE, Receiver.

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What an Eminent Railroader thinks of it.

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Commendation from the source whence this came must have been particularly gratifying to the Reading Railroad officials. It has always been the aim of the present Reading management to provide the very best for its patrons, and the service on the Royal Blue Line, as well as on other portions of the System, is conclusive evidence of success in that direction. That the discriminating public appreciate these efforts, and recognize the fact that the Royal Blue Line trains are as advertised, the finest, fastest and safest in the world, is evidenced by the constantly increasing business on that Line.

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The book is designed to make the methods of block signaling clearly understood and to show the present development of the art on American railroads.

PRICE, $2.00.

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AMERICAN PRACTICE

—IN—

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With Descriptions and Drawings of the Different Systems in Use on Railroads in the United States.

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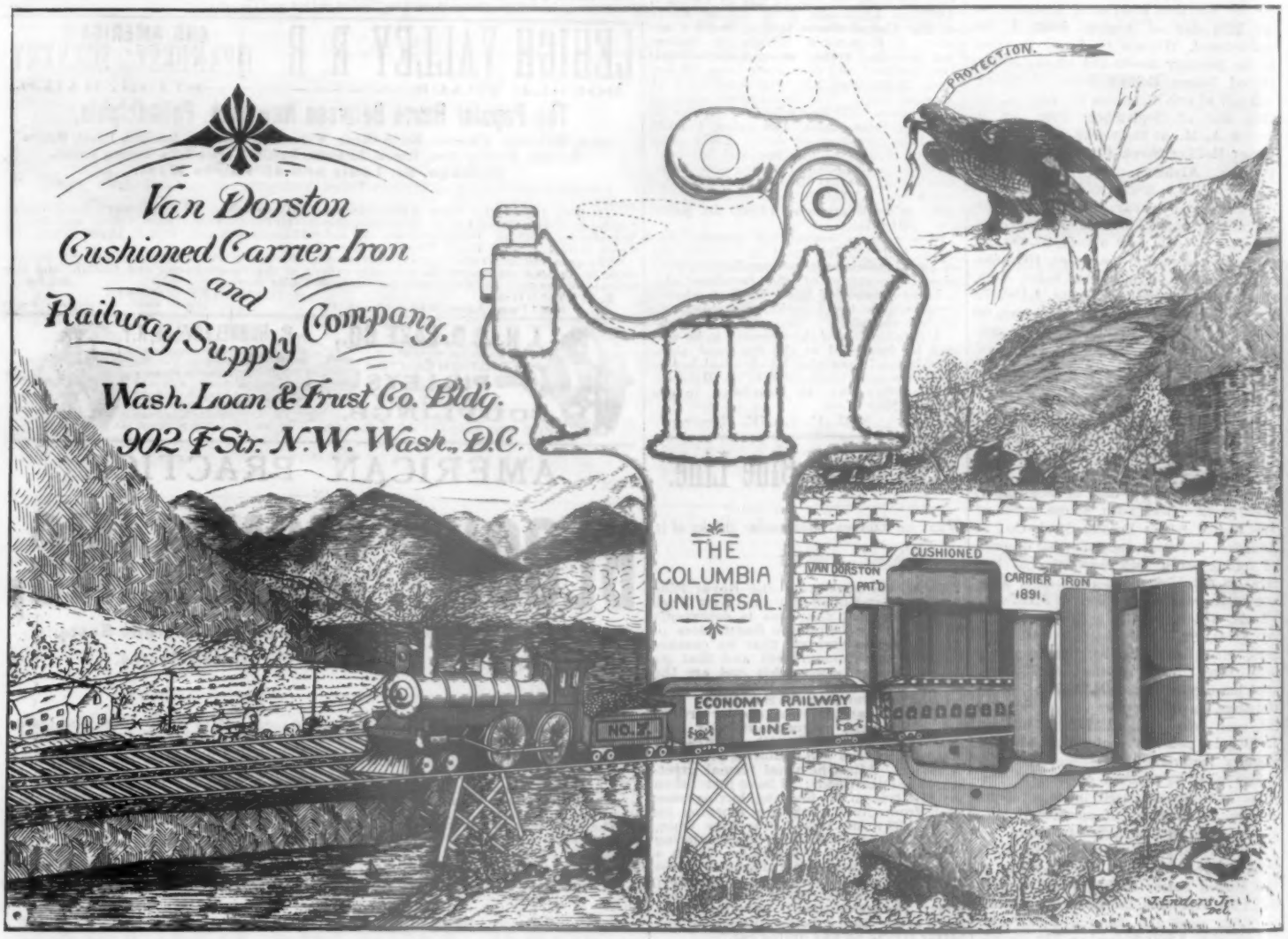

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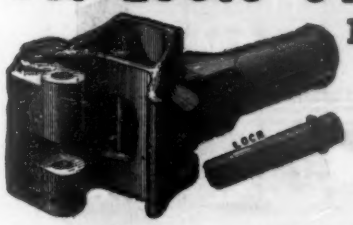

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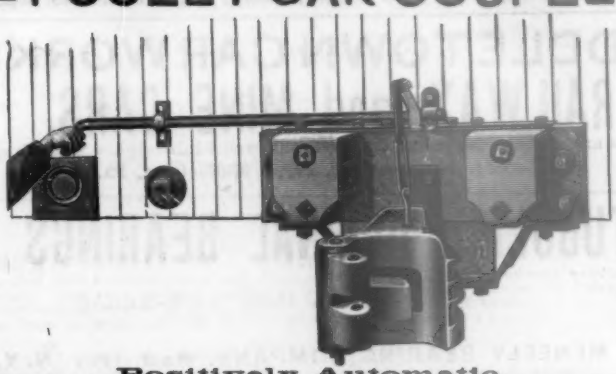

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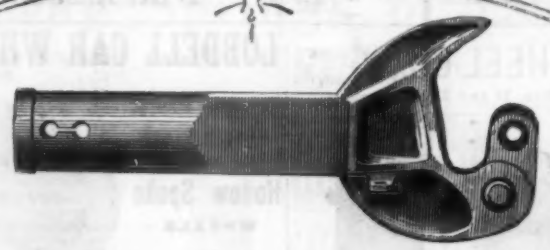

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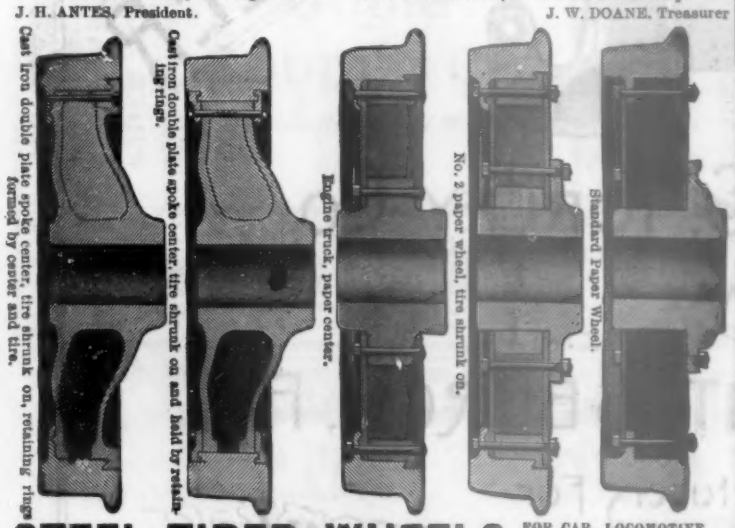
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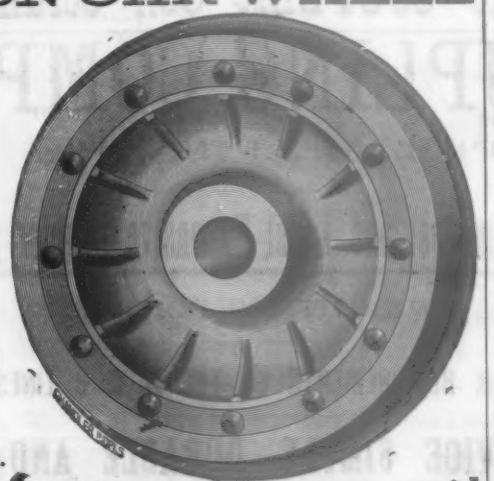

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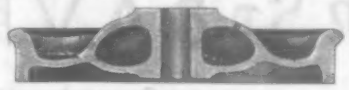

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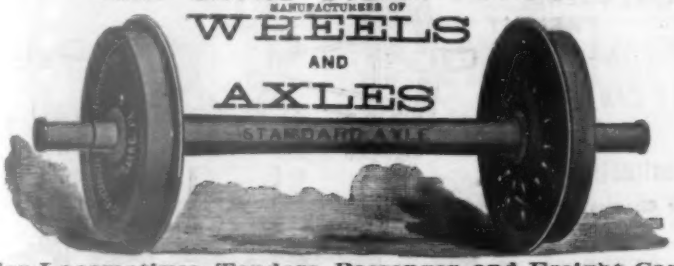

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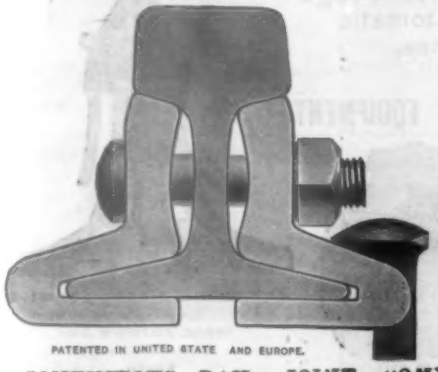

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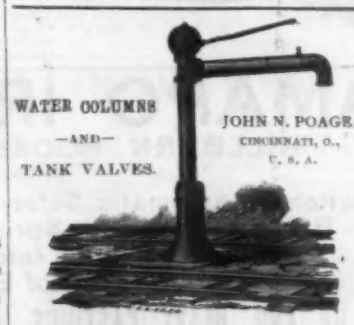

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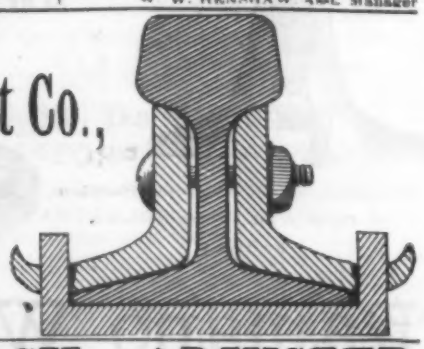

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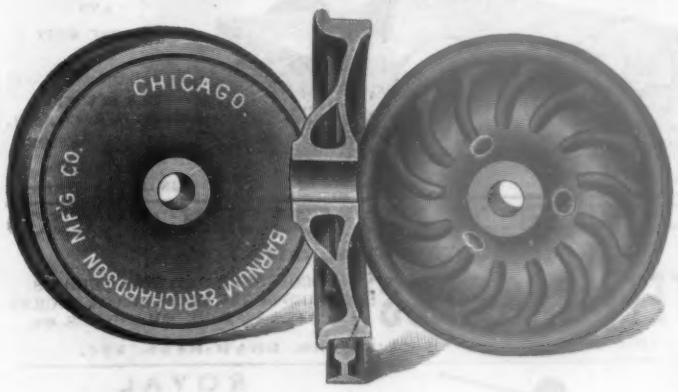

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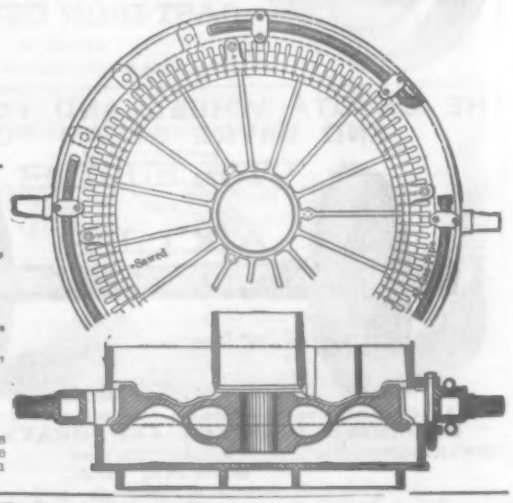

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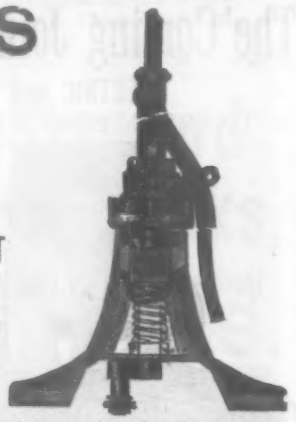

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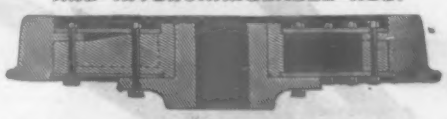

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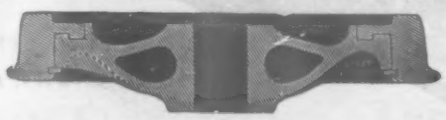

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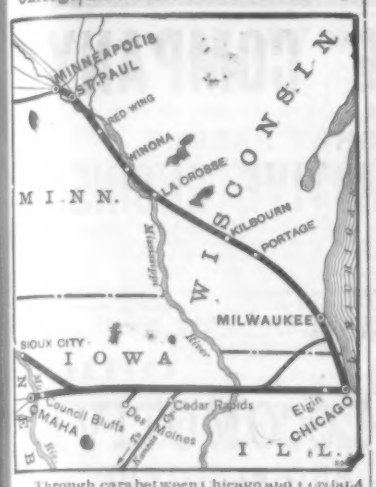

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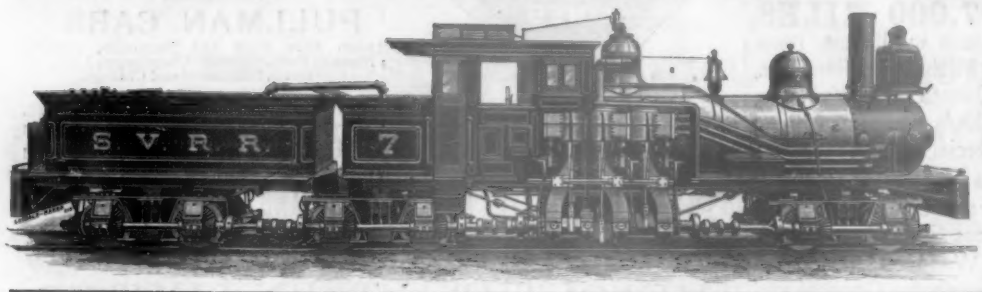

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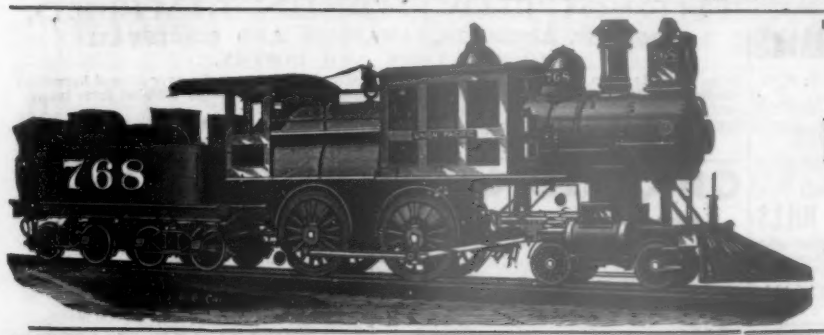

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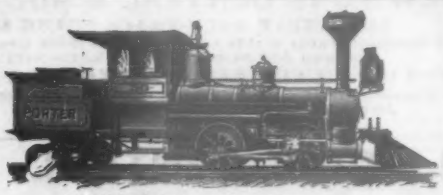

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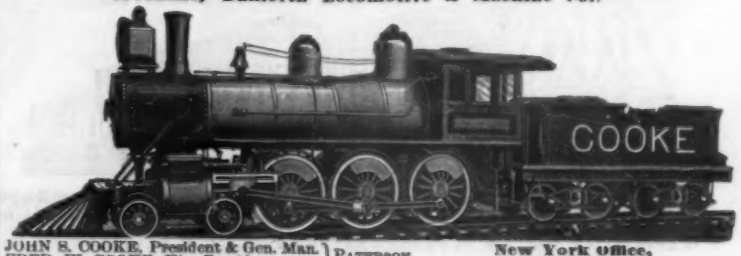

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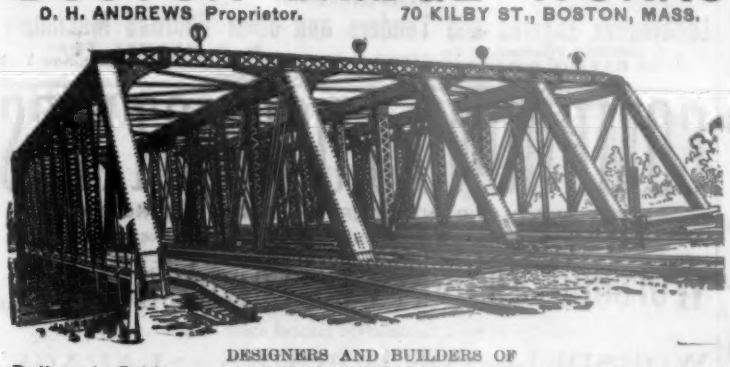

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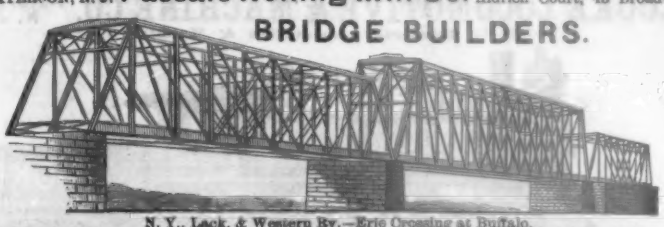

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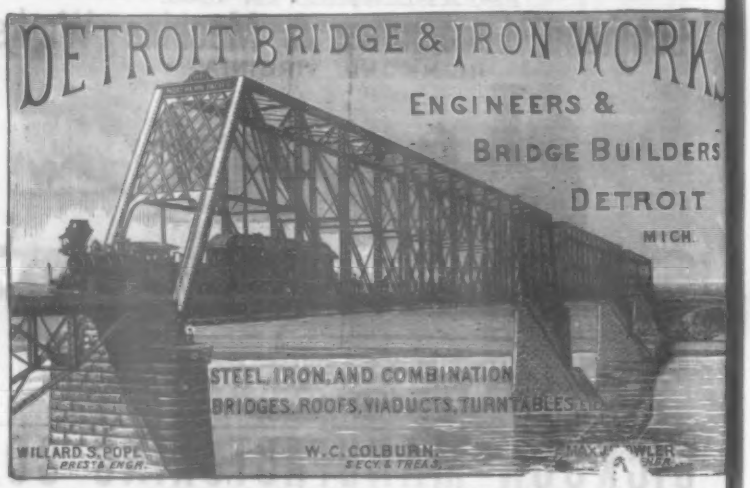

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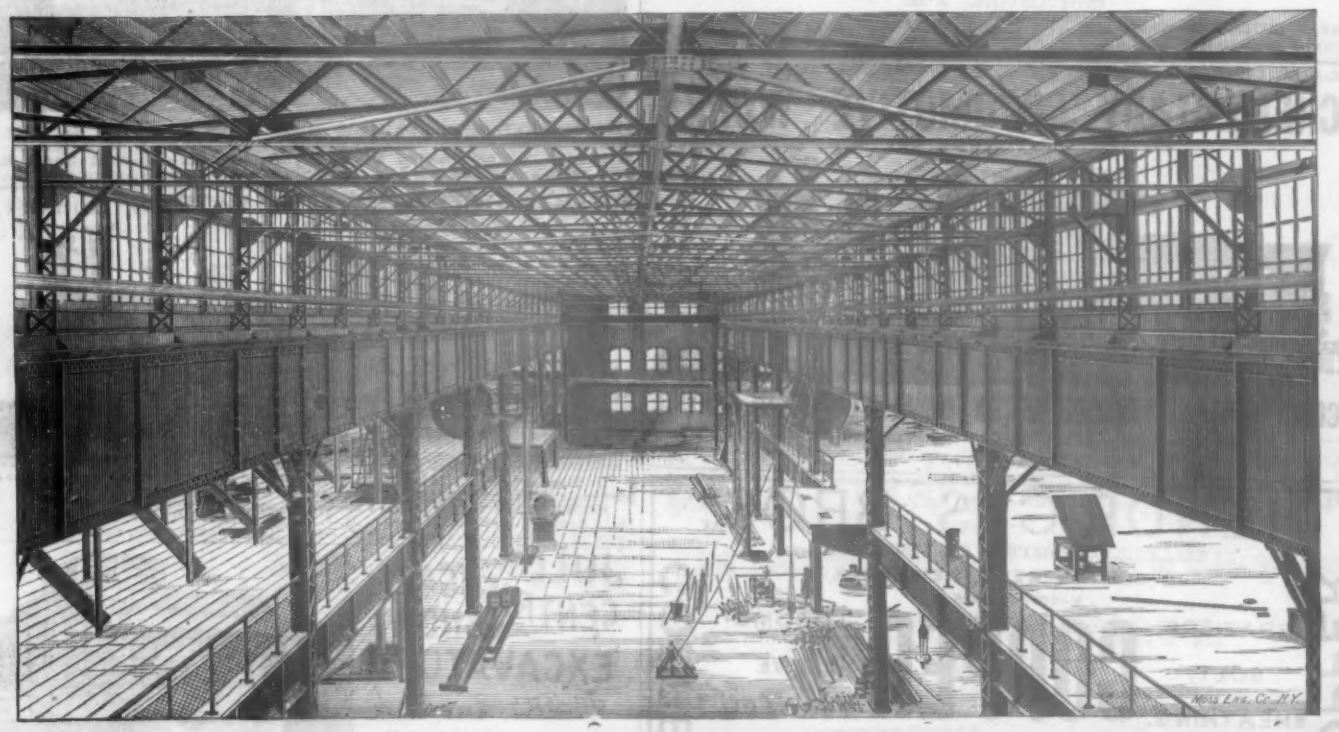

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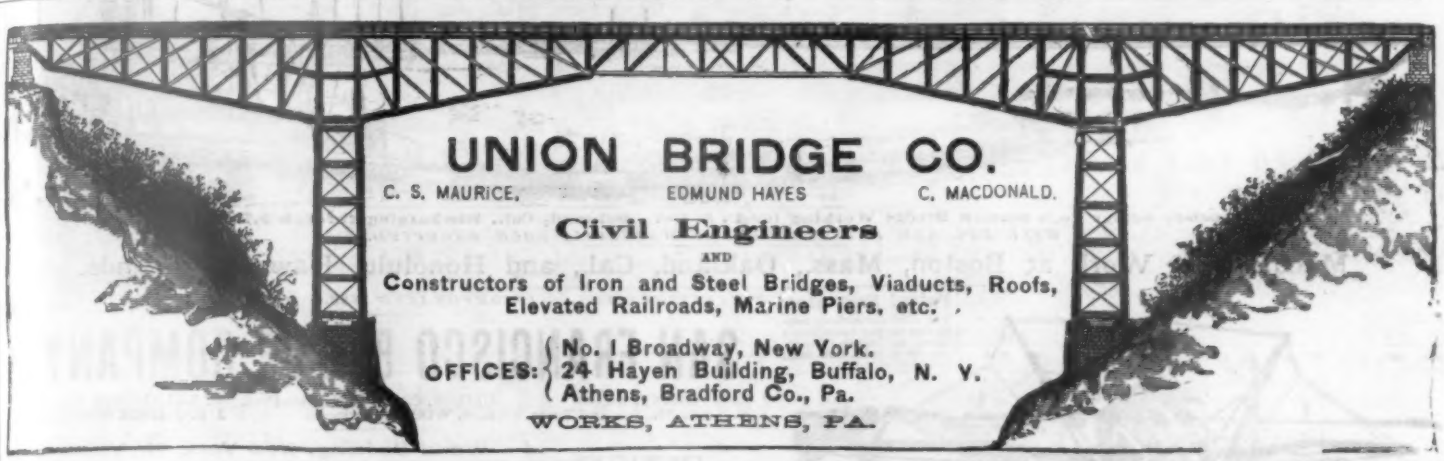

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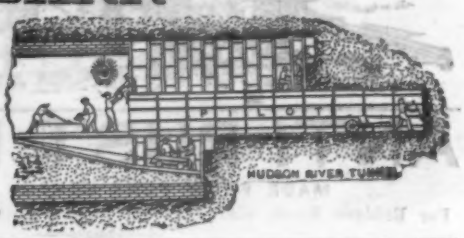

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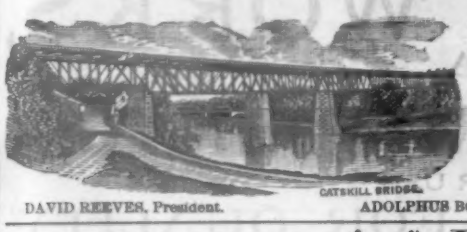

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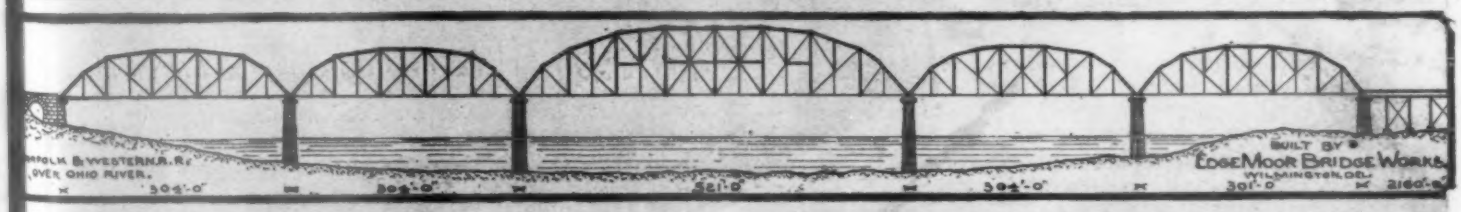

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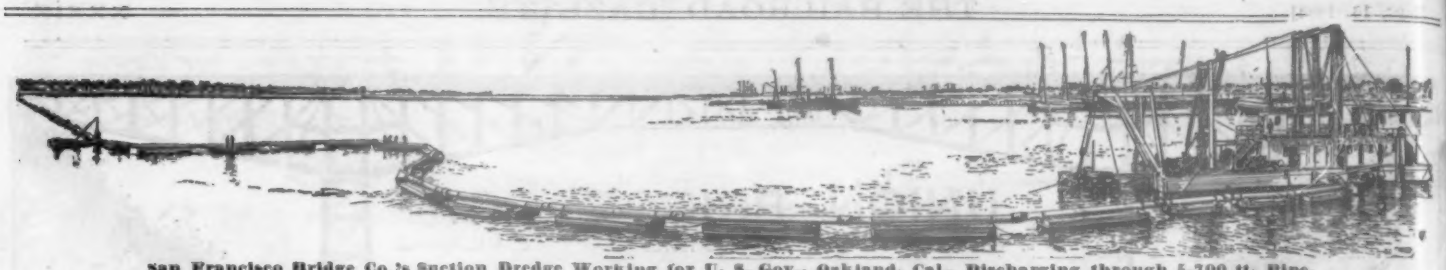

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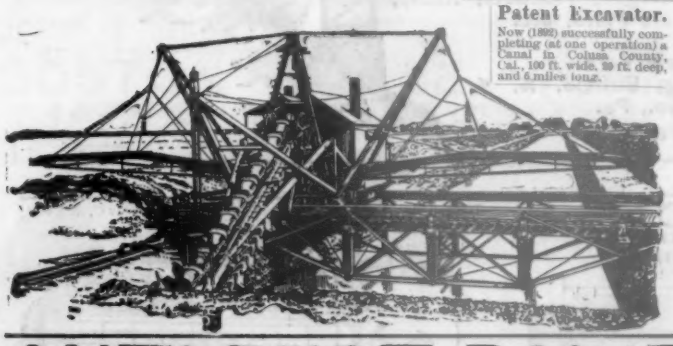

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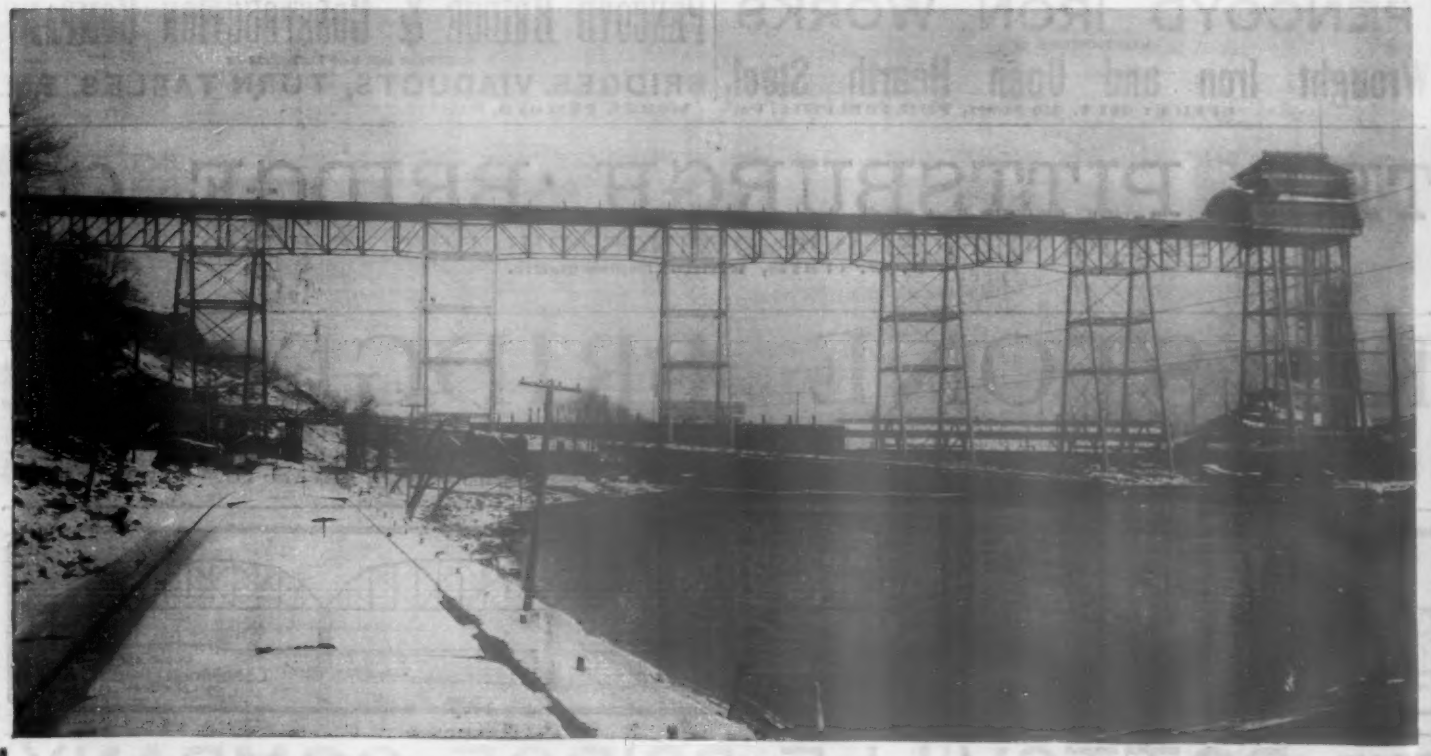

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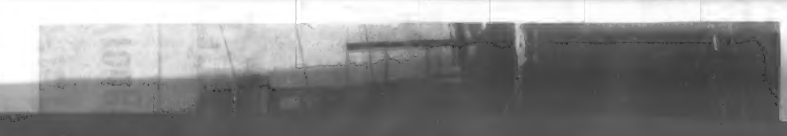

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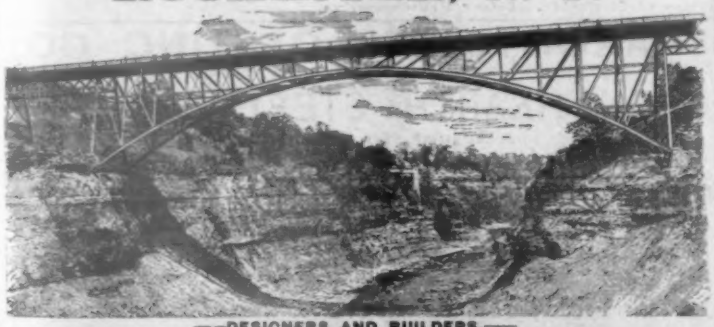

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